



new dynamics of ageing
a cross-council research programme

THE NDA HANDBOOK



A summary of the key findings from the
New Dynamics of Ageing Research
Programme

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FOREWORD

It is my great pleasure to publish this Handbook which contains the main findings of the New Dynamics of Ageing (NDA) Research Programme packaged for a wide audience. The NDA Programme was one of the largest and most complex research initiatives on ageing ever mounted in the UK or in Europe. It was funded by the five Research Councils whose logos are displayed on the cover (Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences Research Council (EPSRC), Economic and Social Research Council (ESRC) and Medical Research Council (MRC)). They span scientific disciplines from biology to arts and humanities, and the Programme not only reflected that wide range but also attempted to combine the different perspectives as much as possible. Many of the 35 projects funded under the programme were multi-disciplinary and so was the programme as a whole.



The projects have produced hundreds of academic papers and the NDA Programme has its own book series published by Policy Press. In addition each project has produced a lay findings document that summarises the research and its outcomes for a general audience. As the final component of the published outputs from the programme I wanted an even more accessible summary intended especially for older people and those working with them (following the model pioneered by the ESRC Growing Older Programme in the 1990s). This demanding task was entrusted to Tessa Harding who has done a magnificent job. Working with the NDA Older People's Reference Group she has managed to distil the essence of each project and the programme as a whole. She has also drawn out important lessons for others considering embarking on such a mammoth research effort.

I wholeheartedly commend this Handbook to everyone interested in ageing and its implications. In particular I hope as many older people as possible will get to see a copy and will be able to note the many important findings to emerge from a huge research endeavour that was intended, ultimately, to contribute to improving quality of life as people age.

A handwritten signature in black ink that reads "Alan Walker". The signature is written in a cursive, flowing style.

Alan Walker
Director

New Dynamics of Ageing Research Programme



The NDA Handbook

SECTION 1: Introduction

This Handbook presents, in summary form and lay language, key messages from the New Dynamics of Ageing (NDA) Research Programme. It has been prepared on behalf of the Programme Director and, as requested, in close discussions with the Older People's Reference Groupⁱ, whose members have been involved both in individual research projects and across the Programme as a whole since the early days of the NDA. It complements the NDA Older People's Reference Group 'End of Programme Report' which analyses the process of that involvement.

This Handbook is intended as a guide to the research outcomes for a lay audience, and particularly for older people and their organisations. It aims to put the new evidence and new insights generated through the research into the hands of older people themselves, so that they can make use of this information to spread new knowledge, to campaign, and to influence policy and practice.

There are many organisations of older people, such as the National Pensioners' Convention, the University of the Third Age and over 600 local Senior Citizens' or Older People's Forums across England alone, with more in Wales, Scotland and Northern Ireland. Forums are democratic organisations run by older people for older people; they exist to represent the interests of older people to policy makers and service providers in their area and many are extremely effective advocates and skilled campaigners. We hope that they and other older people's groups will make good use of the information in this Handbook.

The Handbook is inevitably very selective: the research Programme itself comprised thirty five projects covering a very wide range of fields. We have given a brief summary of each one and included further information about each project, so that those who wish to go back to source for more detailed information can do so.

History and objectives

The New Dynamics of Ageing Programme followed the earlier Growing Older Programme (1999 and 2004) and parallel programmes under BBSRC (Biotechnology and Biological Sciences Research Council) and EPSRC (Engineering and Physical Sciences Research Council). The Growing Older Programme broke new ground in its time by commissioning 24 projects all focusing on aspects of quality of life in old age. It was funded by the Economic and Social Research Council (ESRC) and led by Professor Alan Walker of the University of Sheffield. Its two objectives were to generate new knowledge on extending quality of life in old age, and to contribute to policy and practice in the field, so that the research made a practical contribution to improving quality of life. One of the distinguishing features of the Growing Older Programme was the vigorous effort made to disseminate the findings of the Programme and to make sure that its lessons were learnt and had a practical impact.

ⁱ See Appendix 1: Membership of the Older People's Reference Group

The New Dynamics of Ageing built on the experience of the earlier Research Council programmes but added ambitious new dimensions. Firstly, it was very clearly a multi-disciplinary Programme. It attracted funding from all five of the major Research Councils which fund scientific research in the UK, the first time this level of joint commitment had been achieved. Their interests span biological, medical, economic and social research, the arts and humanities, engineering and the physical sciences (AHRC, BBSRC, EPSRC, ESRC and MRC).

Secondly, the large projects were themselves expected to be multi-disciplinary; each one was to draw on expertise from more than one discipline and in many cases to involve multiple academic institutions.

Thirdly, older people were to be involved directly, not just as objects of study but as participants in the whole research Programme. The Programme proclaimed its intention to 'build the involvement of older people into its foundations rather than bolt it on at the end'ⁱⁱ The Older People's Reference Group was therefore established early on in the Programme, continued to meet throughout its course and made an active contribution to local, national and international events in which the Programme was involved. A separate handbook is available on the process of that involvement, what worked well and what did not, with valuable lessons for the future.ⁱⁱⁱ

The Older People's Reference Group felt strongly that the research must bring results. Research is expensive; if it is to justify the money spent on it, it must have tangible outcomes. Furthermore, older people work hard at contributing to such research, as subjects, as participants and as advisers. They expect their efforts to be valued and to make a positive contribution to improving the lives of their contemporaries, either directly or indirectly. To see no useful outcome after months or years of effort is more than disappointing, it is wasteful of precious time and energy.

Finally, one consistent objective across both the Growing Older Programme and the New Dynamics of Ageing was to ensure that the research has an impact, that lessons are learned and that the research influences policy and practice. The NDA Programme 'was designed to provide a sound evidence base for policy and practice, so that research contributes to policy and practice.'^{iv} This was an objective both for the Programme as a whole and also for the individual research projects. Many of them took steps to engage with local communities and policy makers and worked to influence the development of policy directly.^v

The Older People's Reference Group therefore looked for evidence that the New Dynamics of Ageing research would have an impact, that it will deliver solid outcomes and real benefits to older people. They want to see that it had made – or will make - a difference. Will it change attitudes towards older people? Will it make a difference to how services are delivered or how professionals act and make decisions? Could it improve the environment in which older people live and the communities with which they interact? Will it help old people to understand more about themselves and their contemporaries?

ii NDA News issue 2 p14

iii NDA Older People's reference Group: End of Programme Report 2013

iv Director's annual report 2011 p1

v Director's annual report 2011 p40

Observations and recommendations

We have several objectives in producing this Handbook: firstly to provide a lay guide to the main findings of the research projects that make up the Programme; secondly to put these findings into the hands of older people directly so that they can use them to influence action and effect change; and thirdly, to assess from the point of view of members of the Older People's Reference Group the potential impact of that research on the lives of older people and the world in which they live.

Finally we look across the Programme as a whole and draw some observations from it. For example we note that design – of clothing, of kitchens, of public spaces, of stairs and so on – has not kept pace with changing demographics. Design needs to become much more inclusive and age friendly, not as a special concession or just because it is required by legislation, but as a normal part of daily life. We appear still to be designing many things as if older people were a small and insignificant minority in society, when that is not the case now and will become even less so in future.

Further, several research projects illustrate the need to banish demeaning and misleading stereotypes and to recognise the great diversity of older people, who may, indeed, have nothing in common **but** their age.

We also find that older people are still too often represented as passive recipients rather than as active and contributing members of society. We know this to be far from the truth and would like to see research attention being given to assessing the contribution that older people make to society at all levels and in all fields: to each other, to their families and neighbourhoods, to the arts, sport and politics, to employment and volunteering, to businesses, to the economy and to wider society.

We think it is essential that older people should in future play a significant part in deciding, at the earliest stage of planning, **what** research is needed, so that their concerns and their priorities are reflected in future programmes.

We recognise that research on illness and disability is likely to be of value to many older people, amongst others, but we are keen not to exacerbate misleading stereotypes associating age with inevitable illness and disability.

Finally, we recommend that an online shop window is developed to let older people know directly what useful ideas, devices and resources have become available as a result of the NDA research, so that they can access these themselves.



SECTION 2: Overview of The Research

The fact that the population is ageing, both in the UK and around the world, is well recognised. Human societies today already look very different from how they did a hundred or even fifty years ago, and they are continuing to change.

The dramatic increase in longevity has focused the attention of policy makers on older people as never before. That focus has not always been a positive one. The growth in the older population is often seen as a threat and a looming crisis, with alarm expressed about the cost of pensions and the prospect of increasing demands on the health and social care system. These are clearly legitimate matters of concern, especially to governments and taxpayers.

However, implicit in these anxieties is an image of ageing and of older people that is rooted in the past and that takes little account of the changing nature of 'old age'. The stereotypes of old age are powerful and long lasting. One research project in the New Dynamics of Ageing Programme focused specifically on how concepts of ageing are changing. It investigated the cultural representation of ageing and its relationship to lived experience. People in their 60s and 70s, it concluded, no longer consider themselves old, while those in their later 70s and beyond continue to live full and varied lives despite infirmities.^{vi} As the NDA Programme indicates, the negative view of ageing as a threat is increasingly being countered by a more measured approach which aims to find out more about the older population, to understand its characteristics and to break down some of the stereotypes that blind us to the realities of ageing today.

One consequence of this emerging interest in ageing was the Growing Older Programme (1999 – 2004), itself an innovation, funded by the ESRC, which sought to define and evaluate quality of life in older age with a particular focus on older people's own definitions. Other similar initiatives were funded by the ESRC and other Research Councils including The New Dynamics of Ageing (NDA) Programme which threw its net very wide indeed and examined ageing from a range of perspectives, from cellular ageing to self image, and from the value of participation to the importance of sleep. It embraced both life in the UK and life in other communities, in India, Brazil and South Africa, for example, where circumstances may be very different but where many of the issues arising from increased longevity turn out to be surprisingly similar.

Clearly, we are still in the early stages of understanding the implications of this huge demographic change, at an individual and a family level and at the level of communities and wider society. Public policy on ageing has certainly yet to catch up with the changing reality. In its report published in March 2013, the House of Lords Select Committee on Public Service addressed the issue of an ageing population head on. 'The UK population is ageing rapidly, but we have concluded that the Government and our society is woefully underprepared. Longer lives can be a great benefit, but there has been a collective failure to address the implications and without urgent action, this great boon could turn into a series of miserable crises.'^{vii}

In his overview of the Growing Older Programme in 2004^{viii}, Malcolm Dean made a related point: he said that 'a society which was so successful in reducing the injuries of biological ageing was pathetically weak in addressing the injuries imposed by social ageing'. Nearly ten years later, what progress if any have we made in reducing those injuries? Has social policy caught up with the facts of an ageing population and the changing nature of ageing itself? Or are we still constrained by the preconceptions and expectations of an earlier era?

vi NDA Director's Report 2012 p45

vii House of Lords Select Committee on Public Service: Ready for Ageing? March 2013

viii Dean, Malcolm: Growing Older in the 21st Century ESRC 2004

The thirty five research projects of the NDA Programme have the potential to help us to understand this changing landscape. Can they also help us to adapt to the new demands it presents? What outcomes can older people expect to see as a result of this major investment in research into aspects of ageing?

Towards equality

In one respect at least, we have undoubtedly made progress. Until 2010, and with very few exceptions, it was legal to discriminate against people on the grounds of their age. Older (and younger) people were subjected as a matter of course to both direct and indirect age discrimination.^{ix} Such discrimination was pervasive and so much taken for granted that it caused little surprise or indignation. To a large extent this is still the case today, and older people's experience has barely changed; but the law at least has.

The Equality Act 2010 makes it unlawful to discriminate on age grounds, thereby putting age on a similar footing to race, gender, disability, sexual orientation and other protected characteristics. Age discrimination in employment, education and training became unlawful in 2010, while legislation banning age discrimination in access to goods and services finally came into force later, in October 2012. This was a major leap forward, though marred by the remarkable flaw that the ban on age discrimination does not apply to financial services.

Anti-discrimination legislation came not before time: 60% of older people questioned in 2012 said that age discrimination affected their daily lives, while over three quarters said that the country fails to make good use of their skills and talents.^x Not only has society failed to shift to accommodate older people in all their diversity, it is wasting their potential too. Both older people themselves and the wider community lose out if the energy and resources they could bring to the common good are not recognised, appreciated and encouraged.

In 2014, it is still too early to know how effective the equality legislation will be in practice and how much impact it will have. What we do know, from the experience of race, gender and disability discrimination, is that legislation is just the first step and a great deal more work remains to be done beyond that to turn aspiration into reality. Nonetheless, legislation makes a crucial statement about the unacceptability of discrimination on age grounds and puts a potentially powerful tool for challenging unfairness into the hands of older people.

The Equality Act goes further: it also introduces a public sector equality duty, which requires public bodies and those carrying out public functions to eliminate unlawful discrimination and advance equality of opportunity. It is not just up to older people themselves to challenge age discrimination where it exists, but up to public bodies too to identify it and root it out. The onus is on all of us to ensure that there is age equality in access to housing, transport, health, education and similar public services. (One study not in the NDA Programme has analysed people's access to services from an equality perspective and more are needed.^{xi})

Beyond legislation, we still need to reshape the concept of old age and rid it of the stereotypes and the pervasive ageism that disfigure our current thinking, policy and practice. Older people need to be considered not as a race apart, saddled with stereotypical characteristics, but as individuals, with all the diversity that that implies. As many of the NDA projects make clear, they are a very diverse group, spanning up to fifty years in age and diverse in every characteristic

ix Harding, Tessa: The long and winding road: Towards dignity and Equality in old age. Help the Aged 2006

x Age UK: Later Life in the UK; Age UK Jan 2013

xi Moriarty and Manthorpe: Diversity in older people and access to services. Age UK 2012

from their ethnicity and family structure to their educational attainment and from their sexual orientation and economic status to their health. Most people will one day become an 'older person' and form part of this cohort.

Several of the research studies in the NDA Programme take purposeful steps towards reshaping conceptions about older people and their circumstances, exploring and questioning the way older people see themselves and painting some very different pictures of the challenges of old age.^{xii} Easy assumptions about older people need to be discarded and fresh questions asked. The NDA Programme is part of this process, opening up the debate and taking positive steps towards that end.

The NDA Research Programme.

The research funded under the NDA Programme was based around two major themes: ageing well across the life course, and ageing and its environments. The range of research projects funded under these headings was extremely varied. Projects focused on very different issues, were directed towards different audiences and anticipated different outcomes.

There are three distinct approaches, each of which is of interest in its own right.

- Some research projects took an area of existing knowledge and set out to build on, refine and extend that knowledge. The audience for this kind of research is probably primarily academic.
- Other research projects examined an area of professional practice and explored different options for improving that practice and getting better results. The audience here would, one assumes, be primarily professional.
- Yet others set out to take a fresh view, to question existing assumptions and to present an alternative interpretation of the subject in question. This research set out to get over a public message, to shift attitudes, and is directed broadly at politicians, policy makers, the media and older people themselves.

The kind of impact a research project could make clearly varies according to its focus. Our aim in this analysis is to assess what is likely to change for older people as a result of the research; we are concerned with outcomes and the actual or potential benefits to older people. Since the aims of each project are different, the intended outcomes will equally be different.

Of course, even the most successful research can take time to have an impact, so it is not possible to predict short or long term outcomes with any certainty. Something that looks promising on paper may fail to attract money to develop an idea or a piece of equipment, or may not be taken up by those who could help to develop its potential. It must be recognised too that this particular research Programme reported at a time of austerity, and its impact and potential for implementation were therefore likely to be constrained by wider economic conditions.

The impact of a piece of research is not just a reflection of the value of its intrinsic message but also of how well and effectively it is promoted. Research skills and influencing skills are both needed for an impact to be made. The NDA Programme was very well aware of the need to promote new learning to policy makers and practitioners and to ensure that it was integrated into their thinking. A dynamic Programme of promoting the research findings to a variety of audiences was built in to the planning of the Programme. Some individual projects were able to attract follow-on funding to enable further developments based on the research, such as

xii House of Lords Select Committee on Public Service: Ready for Ageing? 19th March 2013

training packages or public information materials, while several, for example those based in Manchester (**Findings 18**) and in Chennai in India (**Findings 5**), worked closely throughout with policy makers and those who have a say in translating knowledge into practical reality. Where this happens, it can prove highly effective and achieve significant results.

The analysis below aims to indicate where potential outcomes of real interest to older people seem to exist.

Five categories of research have been identified where an impact could be made:

- Research which aims to make practical improvements to the lives of older people.
- Research which aims to make a difference to the environment in which older people live.
- Research which challenges assumptions and stereotypes.
- Research which aims to improve wellbeing and the quality of life, including social life, of older people.
- Research which aims to inform future plans and policies for an ageing population.

Of course these categories are not necessarily mutually exclusive and many research projects cross boundaries and may be equally at home under two or more headings.

1. Research which aims to make practical improvements to the lives of older people

A number of research projects in the Programme set out to make practical improvements to the lives, including the health, of older people, and to create new tools or ideas to enhance practice.

Research from Glasgow School of Art and colleagues (**Findings 1, see section 3, p28**) is one example of the development of a new tool. The researchers set out to find a better way of understanding the pain and difficulty that some people experience in accomplishing routine tasks, such as sitting down or getting up from a chair. They created an animated stick person on a computer screen which enabled patients, healthcare professionals and designers to 'see' and discuss the level of stress or pain in the joints. Everybody found this device easy to use and the researchers felt that it could have benefits in the assessment, diagnosis and treatment of joint problems, as well as in communication and education. It also had potential to provide valuable information to those who design furniture, buildings and equipment. Further work was needed to develop the prototype and ensure it could be used in different environments. This research clearly has the potential to make a real difference to the lives of everyone with mobility problems, old or young, in a highly practical way, provided that the tool can be developed and made widely available.

Not all projects had such a clear outcome. Research by Northumbria and Newcastle Universities (**Findings 3, p30**) explored the relationship between mobility and successful ageing. A group of older people were asked to keep a diary of their activities and to wear a tracking device to map their movements. The participants, aged between 72 and 92 and in good health, were only moderately active. They were largely sedentary and did not on the whole move far from home. The researchers felt that it was important to monitor and encourage mobility in order to promote healthier lifestyles and forestall potential health problems. However, the tracking devices used were not popular with the participants, who felt they were intrusive. Such a negative finding can of course be as valuable as more obviously positive ones in prompting new thinking and new approaches to familiar problems.

Sometimes, research can reveal a gap in policy that cries out for action. Research led by Brunel University (**Findings 7, p34**) examined how health and social care professionals and bank staff make decisions when faced with the suspected financial abuse of older people. Making the decision to do something about suspected financial abuse proved to be a complex process. Both groups of professionals weighed up the situation carefully and decided whether and how to respond, and they were consistent in their approach. However, neither the health and care professionals nor the bank staff had specific guidance on which they could rely. The research flagged up a significant gap in guidance that needed remedy. The project subsequently received follow-on funding from the ESRC to develop training tools for professionals and to raise public awareness. 'The prime outcome of this study will be guidelines for the detection of financial elder abuse for professionals involved in the provision of care and services. Hence, the ultimate beneficiaries are older people.'^{xiii}

Good sleep is important for everyone's well-being, and helps to ensure that older people are able to be fully alert and active during the day. The Somnia research project on optimising the quality of sleep (**Findings 11, p38**) studied several different approaches to improving sleep amongst care home residents and older people living at home. It concluded that poor sleep is not a necessary consequence of ageing; illness and the effects of medication should be considered first as possible causes. In care homes, poor sleep may be exacerbated when older people spend too many hours in bed, while sleep can be disturbed by night time staff routines. Changes in the eye mean that brighter light, especially blue light, is needed to enhance daytime alertness; being active during the day helps to improve sleep at night. Self-help techniques based on cognitive behavioural therapy proved very successful over a six month period in helping people manage their own sleep patterns, with the help of six booklets.

There are significant lessons for care homes and their regimes from this research, and several valuable ideas for enhancing sleep in people's own homes, both of which could make a significant difference to the wellbeing of many thousands of older people. Considerable interest has been expressed and various products to enhance sleep in care homes are being developed commercially.^{xiv} There was also interest in the self-help sleep management techniques, which have subsequently been taught to NHS therapists. An adapted version of these techniques has been developed for people with Parkinson's Disease. This is a good example of the kind of research outcome that should be readily available directly to older people, perhaps through the kind of 'shop window' proposed in our recommendations.

Another highly practical project, led by Brunel University (**Findings 12, p39**), researched how to minimise the impact of incontinence on the lives of older people. Urinary incontinence affects 60% of women over 40 and half as many men, and impacts on people's confidence and wellbeing. One problem is the lack of public toilet facilities; the project addressed this by working with the Royal College of Art to produce the Great British Public Toilet Map.^{xv}

The project also examined the quality of continence services and developed two kinds of helpful equipment: 'smart underwear' to detect leakage and a colour-change odour detector. These were both felt by older people to be a good idea but needed testing in real life situations. Again, this research has the potential to improve people's lives if the ideas are developed and become something that older people can readily access and use.

xiii NDA News, Issue 1, December 2007, www.newdynamics.group.shef.ac.uk

xiv NDA Director's Annual Report 2012 pp12-13

xv <http://greatbritishpublictoiletmap.rca.ac.uk>

A project on encouraging healthy lifestyles among older Bangladeshi women living in Britain (**Findings 17, p44**) set out to compare their lifestyles with those of their daughters in the UK and those of their counterparts who had remained in Bangladesh. The older women living in Britain had relatively poor health with high rates of obesity. Those in Bangladesh lived in large multi-generational households, while those living in the UK had fewer opportunities for physical activity and social interaction outside the home. Older women in the UK got most dietary information from health professionals and from family members. The researchers concluded that bi-lingual and spoken information in Sylheti was needed, while dietary advice should be tailored to culturally appropriate eating styles. They also identified possible ways of improving physical activity and social interaction through dance, gardening and other initiatives. The project received a lot of interest from both policy makers and health professionals, including an opportunity to present the findings to key members of the Welsh Assembly Government.

Scientists in Lancaster worked with colleagues in NHS Highland and at Sheffield University to measure the changes that occur in the cardio-vascular system as we age (**Findings 19, p46**). The research determined that what governed the interaction between heart and lungs was the health of the inner lining of the blood vessels, the endothelium. As people age, the cardiovascular system begins to function less efficiently as a single entity and the extent to which blood vessels in the skin react to a chemical stimulus decreases. The researchers were able to measure this change to estimate someone's 'endothelial age', which could be either greater or less than their chronological age. In fact there were wide variations between individuals, with some older people having a strikingly 'young' endothelium and vice versa, probably due to diet and lifestyle. The endothelium can also be stimulated by a rise or fall in skin temperature and the researchers proposed to design a device similar to a large wristwatch, to measure endothelial health as the skin first warms then cools. They envisaged that this 'endotheliometer', once developed, could be used by a variety of health professionals, and potentially by the general public, to give an indication of general health.

Another medical research project (**Findings 24, p51**), based at the University of Birmingham, had very significant implications for many thousands of older people. Over 80,000 people in the UK fall and fracture their hip each year. These fractures are treatable but for reasons which have been unclear, many older patients fail to recover as well as they should.

This study set out to test the theory that depression could make the physical stress of hip fracture worse in older adults. The researchers found that about a third of hip fracture patients developed depression within six weeks of surgery, and when they did, they took longer to recover, had poorer physical function and were more susceptible to infections than those who were not depressed. The development of depression, it appears, has a significant effect on the immune system and on the balance between immunity suppressing and immunity enhancing hormones. The researchers concluded that the efficacy of the immune system is affected both by age and by stress, and that speed of recovery in older patients could be enhanced by treating depressive symptoms. This research clearly has very important implications for older people with hip fractures and potentially for older people with other conditions too. It should undoubtedly be widely promoted.

2. Research which aims to make a difference to the environment in which older people live

Where older people live and how they get around is crucial to their quality of life: their comfort, social contacts, capacity to manage their lives and their enjoyment of day to day life. Very few places, indoors or out, appear to have been designed with older people in mind, beyond those that are segregated or specifically intended for older people. Ordinary housing, in which the vast majority of older people actually live, makes few if any concessions to the fact that the population is ageing, and adaptable 'lifetime homes', though they have been talked about for many years, are still a novelty.

A research project led by Swansea University (**Findings 4, p31**) focused on the design of towns and cities and outdoor spaces suited to an older population. It found that familiar places are defined not just by what people can see but by what they know about a place, an unseen landscape redolent with memories and associations, which adds character and ambiance. Older people mostly find their way round unfamiliar places by relying on landmarks such as churches and on street signs. Street signs are, however, only useful up to a point, as they are often badly positioned and do not indicate distances. The research highlighted the importance of 'walking routes' and smooth transitions between walking, driving and public transport and underlined the need to involve older people in planning outdoor spaces.

We spend a lot of time in our kitchens. Another project (**Findings 13, p40**) explored how people used the kitchen at different periods of their life, and how kitchens have changed over the decades. The kitchen has remained the hub of the house throughout and very important in people's – especially women's - lives. Older people reported a wide range of difficulties with the layout, design and equipment of today's kitchens. They had difficulties in reaching, lifting, stretching and standing for long periods, in reading small or poorly lit instructions, and difficulties with dexterity and lack of strength. Doing laundry, cleaning and recycling could all be problematic: kitchens, it seems, are not routinely designed with built in flexibility, nor are they designed with older people in mind. Older people involved in the research welcomed many of the features of a 'smart' kitchen, especially those that enhanced safety. This project had the potential to develop materials and design ideas that could be valuable to older people both now and in the future and went on to promote these, though without follow-on funding that might have helped to realise its full potential.

The design of stairs and how older people negotiate them was the focus of another research project (**Findings 31, p59**). The researchers noted that most serious falls involving older people happen on stairs and two thirds of those that subsequently prove fatal happen while people are going downstairs. They set out to find out how older people move while on a staircase, the strategies they employ to descend safely, how stairs are designed and whether exercise to increase leg strength and joint flexibility helped. They concluded that going downstairs demands more of older people than of younger ones, and that staircases with high risers and short treads are particularly difficult. Exercise training did help in some respects. This is a good example of the sort of project that needs to be widely understood by architects, builders, designers, occupational therapists and others as the lessons learned could help to ensure greater safety and fewer accidents as people age.

One project (**Findings 20, p47**) developed a range of 'smart' clothing designed especially for active older people, particularly walkers. Older people worked with academics from a range of disciplines and people from the clothing and technology industries to design a layered clothing system with built-in monitoring and communication capacity. Body scanning captured the size and shape of older male and female participants. Older people informed the design, materials

and colour selection, the styling, and how new technologies were included, and determined how useable the garment was. Prototypes were produced which combined smart fabrics with devices for monitoring vital signs, location and warmth. The research established the need for a positive approach to designing for older people, based on their preferences, not those of the fashion-conscious young. The researchers felt that the project demonstrated the value of working across disciplines, and of bringing academia and industry together to pool knowledge and skills. They concluded that designing for older people with older people resulted in clothing that was functional, aesthetically pleasing and culturally fit for purpose, learning which was then disseminated to students through an academic textbook. Older people represented a new and growing market that was currently neglected.

Another project (**Findings 22, p49**) aimed to develop ideas to improve the health, productivity and quality of life of older workers. The research started from the premise that by 2020, over a third of the UK workforce would be over 50. It found that legislation banning age discrimination in employment had had an impact and that many employers, though not all, valued older workers who brought knowledge, skills and experience to the workplace. Flexible working practices were valuable in helping people to work for longer, but older workers felt this flexibility should apply to everyone, irrespective of their age. A second strand of the research took account of the journey to work and developed ideas for making that easier. A third strand sought ways of encouraging workers to take more exercise, through an initiative called 'Walking Works Wonders'. Additional physical activity resulted in increased productivity and a better quality of life at work and reduced sickness absence. A final strand of the research considered the design of tasks, tools and environments at work and came up with over two hundred practical suggestions for improving health and reducing physical and mental stress, more than half of which involved no extra cost. This highly practical and positive research project produced a number of tools and ideas for wider dissemination through its website and should be useful to employers and older workers alike.

A further project set out to design a better way of providing nutritious food in hospitals and making sure it was eaten (**Findings 29, p56**). Forty percent of people over 65 risk developing malnutrition while in hospital, and this delays recovery. The project analysed existing practice in feeding people in hospital and then tried out various possible solutions to making food more attractive. These included developing highly nutritious mini meals, with smaller portions at meal times. A 'hospitalfoodie' touch-screen computer was also developed which allowed patients to order their meals and staff to monitor their intake.

Another project also addressed the problem of malnutrition in older people. The NANA project (**Findings 34, p63**) also developed touch-screen technology to enable people to record their food and drink intake more accurately, along with their physical and mental activity and mood. Older people were able to use it reliably in their own homes and were able to monitor their own progress. Medical staff had access to ongoing information for assessment purposes. The researchers felt that the system had the potential to detect early signs of malnutrition and other conditions.

3. Research which challenges assumptions and stereotypes

Some research projects make us sit up and take notice, often because they challenge comfortable assumptions and require a change of mindset.

The research project based in Chennai, India, (**Findings 5, p32**) examined the role of older slum dwellers in the urban economy of a newly booming city and found it to be significant but overlooked. Poverty in old age was an increasing though unacknowledged problem in Chennai, which had been through a period of promoting neo-liberal policies of free markets, privatisation and deregulation. The pension was low and the state had assumed that older people were dependent on their families. In fact, the project demonstrated that people continued to support themselves, and indeed other family members, through paid and unpaid work, well into late old age. The researchers demonstrated that stereotyping and age discrimination underlie much current economic and social policy and argued that age issues should be mainstreamed right across the policy arena. The economic role of older people needs to be recognised and protected, while the physical and social consequences of a lifetime of poverty need to be addressed. They maintain that, in situations of extreme poverty, welfare measures should be approached as an integrated system, since measures aimed at one generation impact on others.

This project is particularly striking because the research on which it is based is underpinned by a strong and coherent argument which clearly intends to have an impact on policy. Though the circumstances may differ, many of the themes are recognisable and familiar in a UK policy context and could well apply to any hard pressed community. The project has indeed had some very tangible impacts: for example, in the State of Tamil Nadu, 'ongoing contact with government ministers resulted in both major parties putting pensions in their manifestos, with the result that in spring 2011, the social pension for people over 65, widows and disabled people was raised from Rs500 to Rs1,000 per month. This benefited over 1.5 million people.'^{xvi}

A second research project (**Findings 8, p35**) was also challenging but in a completely different way. This research offered a vivid picture of the demands of late old age. It explored in detail how people in their 80s and beyond adapted to illness and disability over a period of time. Health problems posed a challenge to their identity and sense of self and could erode their dignity. Participants in the study were well aware of the precariousness of their situation and did not find it easy to talk about the future. Adapting to illness took physical, mental and emotional energy but they made great efforts to stay healthy and active and to be as self-reliant as possible. Family life and reciprocal ties were particularly important. Needing help with personal care was often dreaded but was not as bad as they feared, provided that it was given thoughtfully and respectfully. This research highlighted just how hard people have to work, on many fronts, to adapt to failing health, something that is not usually evident to outsiders. It gave the reader privileged access into the very private world of late old age and the image that emerges is not one of weakness but of effort and determination.

A very different project called 'Representing Self, Representing Ageing' (**Findings 10, p37**), involved older women in exploring how media representations played a role in shaping their own experience of ageing. Using photography, role play and other mainly visual methods, the subjects created new images of older women illustrating a wide range of themes, from invisibility and family history to uninhibited exuberance. Awareness of being stereotyped, misrepresented or absent from the media was stronger amongst the younger women participating, but all those involved wanted to see more images of 'ordinary', 'real' or 'natural' older women in the media. The

xvi NDA Director's Annual Report 2012 p 50

images produced during this project were displayed in three public exhibitions which were well received. The researchers felt that there could be common ground between the experiences of older women and those of younger women about how they were represented in the media. The project also took part in a workshop organised jointly with a primary school class, which brought children and old people together over two afternoons in a series of exercises to think about and act out stereotypes for both young and old. One child subsequently reflected that 'older people are really the same as us, just a bit older. They are still fun and have lots to say'.^{xvii}

The Ages and Stages project (**Findings 15, p42**), based in North Staffordshire at the New Vic Theatre, examined how age had been portrayed between the 1960s and the present in the social documentaries for which that theatre is well known, and how older people were involved in the theatre now. Older people had been involved with the theatre over many years and in many capacities. The theatre was seen as a comfortable and friendly place to be, but also a place which offered challenge and new opportunities. The documentaries produced by the theatre, based on local life and local industries, celebrated the community and brought people together. A new play, developed during the course of the project, explored ageing and relations between the generations and the role the theatre had played in the creative life of the area. This led to new friendships, ideas and interests and a more positive view of ageing from old and young alike, challenging existing stereotypes and enhancing confidence and well-being.

Finally, two projects sought to analyse and understand better the process of ageing itself.

One project (**Findings 32, p60**) examined the breakdown of cells. The failure of cells to renew themselves leads to many of the diseases of old age. The researchers developed a new way of studying how cells age in the laboratory and compared this with the natural ageing of cells over time. They then analysed the biochemical changes in ageing cells and tested out the effect of a newly discovered drug called rapamycin. They found that rapamycin did indeed seem to delay the onset of cell ageing and suggested that reducing or removing ageing cells could offer possible new treatments for many of the diseases of old age.

The second project (**Findings 35, p64**) similarly examined the mechanics of cell ageing, by studying the cells associated with Werner Syndrome, in which the ageing of cells is accelerated. They identified and compared the effect of two proteins which regulate the production of harmful molecules in ageing cells, in order to identify one which could be used to intervene in the ageing process or treat some of its effects. They also considered the ethical questions that arise in intervening in the ageing process and suggest that there is no fundamental difference between intervening in the progress of a disease and intervening in the life span.

xvii NDA News: Issue 7 May 2012

4. Research which aims to improve the well-being and quality of life, including social life, of older people

As the Growing Older Programme found out, when older people are asked what constitutes quality of life, family and social relationships come very high on the list.^{xviii}

A comparative study of lower income households in Brazil and South Africa (**Findings 6, p33**) tracked changes in well-being over a six year period. In both countries, the wellbeing of older people was closely linked to that of their extended family. Family relationships and the respect older people received from others were key factors in their well-being. Household income in both countries showed a lot of movement, with some people's incomes improving while others' declined. Pension income was essential to wellbeing, to livelihoods and to social inclusion, and enabled reciprocity between generations. The two countries provided a contrast in social policy and the research concluded that there was no single 'correct' model for addressing age issues in disadvantaged communities.

The Music for Life research project (**Findings 9, p36**), based in London and Gateshead, explored the role of community-based music activities in enhancing well-being and social engagement amongst older people. Those attending music-making classes scored higher in these aspects than those attending other classes, but both rated the benefits of participation highly. Participation had a wide range of social, physical, mental and emotional benefits, including sustaining wellbeing and quality of life, giving participants new skills, providing mental stimulation and social involvement, encouraging co-operation and mutual help and maintaining physical health. Repertoire had to be carefully chosen, and a mix of enjoyment and challenge were important, as were inclusive teaching methods and a welcoming atmosphere. The project received follow-on funding to educate the workforce of music teachers and conductors in the knowledge and resources to work effectively with older adults, and to produce a video and facilitators' handbook.^{xix}

One study (**Findings 2, p29**) set out to refine the older people's quality of life measure that had been developed under the Growing Older Programme. This was a unique multi-dimensional measure of quality of life, founded on the perspectives of older people.^{xx} The new study had a particular focus on older people from ethnic minority communities and on how older people in general define active ageing. Although the concept of 'quality of life' is subjective, the questionnaire that was used produced remarkably consistent results. There were distinct differences of view between minority ethnic seniors and the general population: minority seniors were younger, had poorer health and were less likely to live alone; nearly three quarters of them reported a poor quality of life - a much higher figure than for the wider group. Amongst the whole group, active ageing was defined in terms of physical and mental health, fitness, participation, independence and mobility. 85% of the wider sample said they were ageing actively while only 40% of the minority ethnic group thought they were, though older Chinese people rated their quality of life as markedly better than other ethnic groups.

xviii Help the Aged/Go Programme: Quality of life in older age: messages from the Growing Older Programme 2004

xix NDA Director's Annual Report 2012 p24

xx NDA News: Issue 1, December 2007

Another project (**Findings 16, p43**) aimed to see how digital technologies could be harnessed to enhance the quality of life of two groups of older people living in communal environments, one group in a care home and the other in a convent. Over a period of thirty months, two devices were developed, one a photostroller and the other a prayer companion. The photostroller displayed slide shows controlled by the resident, while the prayer companion presented news and blog items to inform the nuns' prayers of intercession. Both were developed with the residents, with whom a relationship of trust was established. The researchers drew some general lessons from their experience: firstly that one should design not for 'an ageing population' but for many different ageing populations, and secondly, that the design should be based on the particular values and experience of each group. It was not just a matter of overcoming the functional limitations of the residents but of producing something simple and attractive that enhanced their interests and way of life.

A further study based in Manchester (**Findings 18, p45**) set out to find out what older people living in deprived urban areas felt would help to overcome loneliness and promote active ageing. A range of social activities were developed with older people, resulting in art, gardening and exercise classes. Groups were formed, facilitated by the researchers. Most older people were keen to get involved, though some found that difficult and many were initially anxious. The researchers found that poverty, poor services and fear of crime had a negative effect on involvement, as did a personal history of social exclusion and limited opportunities. Manchester City Council and the wider community were involved through newsletters and public events and the project brought a lot of attention to the area. The researchers concluded that the most successful projects were those where older people were in control, but that hands-on help from facilitators and continuing financial support would both be needed to sustain the initiatives and generate more social activity in such disadvantaged neighbourhoods.

By contrast, another project (**Findings 30, p57**) wanted to discover how older people participate in the life of rural communities. It found that older adults played key roles in community life; nearly a third did voluntary work and nearly half had done something to help others over the previous year. Leisure activities added interest and meaning to people's lives, though lack of transport could be a problem for some. Older lesbians and gay men were very aware of prejudice, while older travellers had experienced a lifetime of discrimination. One fifth of older people in the rural areas studied relied on the State Pension alone and some experienced significant hardship. The presence of bus routes or volunteer welfare services could make the difference between isolation and inclusion.

One project (**Findings 26, p53**) explored the social role of art galleries and the response of older people to contemporary visual art. Two groups of older people, one familiar with the visual arts, the other new to them, visited galleries and discussed their reactions. Those who were unfamiliar with contemporary art quickly gained confidence and understanding, while those already familiar with it enjoyed the physical and mental stimulus. Group discussions after the visits were popular whether or not people had enjoyed the art. These created an opportunity for the sharing of memories and experiences which gave people a sense of affirmation and helped to create bonds between them. Galleries were sometimes seen as elitist and used language that people could not understand, which was a barrier, as were various physical impediments such as information in small print and poor access. The researchers concluded that contemporary art needs to be presented in a variety of ways with varying degrees of interpretation if it is to be accessible to a wide range of people.

Another project set out to explore how older people's use of computers and other IT devices could be sustained and enhanced (**Findings 27,p54**). It found that many older people were frequent users of IT and the internet and greatly valued the benefits these conferred. However, poor vision, dexterity or memory could put people off and they were often unaware of features that could help. Support from other people was the most important thing that helped them use technology successfully, but while there were courses to help people get on line, there were few continuing and more advanced ones to help them stay there. The research emphasised the need for ICT developers to improve design for older people and for the creation of opportunities for ongoing learning in community settings.

5. Research which aims to inform future plans and policies for an ageing population

Some kinds of research are undertaken specifically to inform national policy-making, taking a broad brush approach and highlighting trends that may have an impact on future planning.

One research project (**Findings 14,p41**) developed an overview of the older population and calculated the likely size and health of that population over the years to 2030, along with probable family arrangements and personal resources. In this way it aimed to estimate future demand on public expenditure for pensions and long term care. The researchers judged that most of the expected years of extra life would be free of impairment, but that years with impairments would also increase. The trends towards later childbearing and changing family structures meant that families may be less able than they are today to provide care themselves. The researchers emphasised the uncertainties about future mortality and disability rates and about the ability of families to provide care in the longer term. Preventive measures could reduce the overall impact of major diseases. Furthermore, while the costs of pensions and of long term care were projected to rise substantially over the next twenty years, differing policy options impacted on different segments of the population. Given the extent of uncertainty on all these fronts, they urged flexibility in planning for the future.

A further project (**Findings 23, p50**) examined the concept of the 'Third Age', defined as the ten years immediately before State Pension Age for both men and women. It investigated the changes that had occurred in labour market participation for those in the third age between 1971 and 2001, and the impact on their health of combining paid work with caring for a family member. The research found that mortality rates in these age groups had mostly dropped dramatically between 1971 and 2001, with the exception of rates for unemployed women. However, the number of men working up to State Pension Age had also dropped substantially, while the number of women doing so had slightly increased. 24% of women and 18% of men in the age group combined work with providing informal care, which curiously appeared to confer health benefits. By comparing England and Wales with Finland and Italy, the researchers sought to assess the impact of wider social policy on work, health and caring. They raised some far-reaching questions about the implications of these changes, such as whether early retirement should be discouraged and what new social roles may be available to people in the third age.

Older people in Bangladeshi and Pakistani communities living in the UK have to come to terms with growing older in a foreign land. One research project (**Findings 25, p52**) interviewed over 100 participants who had lived in the UK for twenty five years on average. The usual expectation would be for men and women as they age to rely on close family – their spouse and children – for care and support. However migration patterns mean that families were now widely dispersed within the UK and across the world and consequently, those expectations could no longer be taken for granted. While local community organisations offered vital links and were very important as a focus for social and religious activity, they could not replace the family and statutory services were not seen as a desirable solution. These are communities on the cusp of change, having to adapt their expectations to an ever changing environment.

Another highly theoretical project (**Findings 21, p48**) took a long term view of the process of ageing and its interaction with changing environmental conditions. The researchers were able to develop a new formula for computing the sensitivity to environmental change of population growth in natural populations. Using fruit flies as experimental subjects, they sought to discover behavioural patterns that anticipate ageing. They were able to extrapolate from this experiment to develop statistical models to measure the impact of environmental change on the ageing of individuals and the consequent effect on the health of wild populations.

Finally, one very comprehensive study (**Findings 33, p61**) sought to determine the factors that influence how well people age. It made use of nine existing studies which follow up groups of people over time and focussed on three aspects of healthy ageing: physical capacity, psychological and social well-being and biological differences. It also conducted biographical interviews. The research reached wide-ranging conclusions, including the significant impact of where people live and had lived over the course of their lives on their long term health.

Generic Issues arising from the Programme

The New Dynamics of Ageing Programme was rich and varied. Looking across the Programme as a whole, some issues emerge repeatedly and are worthy of consideration in their own right. In discussion with the Older People's Reference Group, the following points were highlighted.

Design needs to adapt to the reality of an ageing population

Project after project examined an aspect of ordinary daily living – the clothes we wear, the kitchens we live in, the stairs we climb, the towns we visit, the way we light communal areas of buildings, the computers we use – and demonstrates how much better it could be designed to accommodate the ordinary needs of older people.

It is clear that the principles that underlie much design urgently need to become more inclusive. Age-friendly solutions to design issues, developed with the help of older people, need to become routine, not as a special concession but as the norm. This presents a challenge to all those agencies that train designers of any sort and to all those that lay down design standards and monitor them.

The need to design with older people in mind will become ever more pressing as they make up an increasing proportion of the population. Ultimately it would benefit us all, since we all age. Inclusive design principles could well benefit younger people too, including disabled people and families with young children. It would make economic as well as social sense and is surely long overdue.

Age friendly design, whether for housing, transport, clothing or the availability of toilet facilities in public places, would enhance older people's capacity to remain independent and improve their quality of life. Without it, many older people will continue to be socially and practically disadvantaged or excluded, creating avoidable problems and unnecessary expenditure for the future

Stereotypes of ageing persist and fail to take account of the great diversity of older people

It is clear from many of the research projects that stereotypes of ageing persist and are still culturally powerful. Several projects have identified and sought to challenge longstanding and deeply rooted assumptions about ageing and older people.

One theme that emerges repeatedly concerns the diversity of older people, just how different they are one from another. One project (**Findings 16, p43**) was very clear about the need to 'design for ageing members of *differing* populations'. Another (**Findings 2, p29**) highlighted major differences in self assessed quality of life between minority ethnic seniors and older people from the general population, as well as differences between minority groups. A third (**Findings 24, 51**) sought to understand and explain why some older people recover well from a hip fracture while others do not.

Given the great diversity of people, making any statement about 'older people' as a whole is liable to be fraught with difficulty. One project, which centred on how old age is culturally defined (**Findings 28, p55**), acknowledged that 'the experience of ageing varies vastly between individuals and groups'. It went on to say that many assumptions about older people, such as that they are particularly fearful of crime and often experience loneliness, are stereotypes and not widely shared. However, another project (**Findings 18, p45**) which worked closely with older people in deprived areas of Manchester found that some older people did indeed say that they were often lonely and found it difficult to be involved socially due in part to fear of crime. It is surely not surprising that the concerns of older people living in disadvantaged communities lacking basic facilities and the concerns of those living in more favoured areas or with different lifestyles are likely to differ profoundly. Equally, the experience of growing old in a rural area (**Findings 30, p57**) will differ from that of living in an urban environment and raises different issues for different people. Lack of transport was a major reason for lack of social involvement for some older people in rural areas, but not for all, while life could be particularly difficult for older lesbian and gay people or for older gypsies and travellers who had experienced a lifetime of discrimination.

Challenging assumptions and stereotypes is no simple task. Such preconceived ideas are deep-rooted, and not just among younger people: they profoundly affect how older people see themselves as well. Some of the research projects in the Programme have tackled these issues directly and sought to change images, especially with regard to women (**Findings 10, p37**). Intergenerational projects such as the schools workshop or the theatre project (**Findings 15, p42**) and the project on active ageing in deprived areas of Manchester (**Findings 18, p45**) have helped to break down preconceived ideas and enabled people to communicate more freely across communities and across the generations. But it is clear that there is much further to go.

Older people are too often represented as passive recipients rather than actors and doers in their own lives and the life of their communities

The roles, activities and contributions of older people are often overlooked, subsumed into the stronger stereotyping of older people as passive recipients of benefits provided by others. One strength of the Chennai research (Findings 5) was that it reinterpreted what it saw, and challenged received wisdoms: for example 'The older urban poor play a vital but unrecognised role in the economy.' 'Older people's work participation is under-counted as much of their work is hidden within family businesses.'^{xxi} Other projects also raised the issue of the contribution that older people continue to make to society. 'Many participants in the research resented the prevalence of ageist policy narratives that emphasise the costs posed by an ageing population but did not adequately recognise the wide variety of contributions that older people make, from taxation through to voluntary work and caring.'^{xxii} (**Findings 28, p55**). The image of older people is thus distorted and unbalanced. This distortion needs to be rectified.

Older people are increasingly remaining in the labour market and their roles and contribution as older workers need to be understood (**Findings 22, p49**). We note that older people often play a significant role in rural communities (**Findings 30, p57**). However, older people as taxpayers, savers and spenders, contributing substantially to the economy, is an issue little analysed or appreciated. The role of older people as grandparents is not widely examined although, just as in Chennai, they contribute substantially to the family economy by enabling parents to go out to work. The demanding work of older people as carers – for a spouse, a sibling, a neighbour – is rarely acknowledged, or explicitly valued and supported, yet this is undoubtedly a crucial, often long term, role without which the NHS and Social Services could not cope. It is a role that will only increase over the coming years as the prevalence of dementia and other disabling conditions increases.^{xxiii} Older people as an unpaid labour force, as the mainstay of local voluntary organisations and community groups, keeping communities and neighbourhoods alive, still appears to be poorly recognised or understood.

Looking to the future

These generic issues deserve further consideration in their own right. The dissemination of the outcomes of the NDA Programme as a whole offers a great opportunity to highlight and discuss them further. They also offer some pointers to the design of future research on ageing issues.

The NDA Programme had two major themes, each broken down into four topics. They were 'Ageing well across the life course' (encompassing Active Ageing; Autonomy and Independence; Later Life Transitions; and the Oldest Old) and 'Ageing and its environments' (encompassing Resources for ageing; Locality, Place and Participation; the Built and Technological Environment; and the Global Dynamics of Ageing). These themes were agreed by the funders of the Programme, the five Research Councils.

The Programme also had the laudable objective of including older people as participants in the research process throughout the Programme, through the Older People's Reference Group, and also in individual research projects. For a variety of reasons, this involvement came about only once the Programme was under way and so an opportunity was missed for older people to influence its overall shape.

There are some key recommendations emerging from the analysis above.

xxi NDA News Issue 5 p 9

xxii NDA Director's Annual Report 2012 p129

xxiii Carers UK press release: Census: 35% surge in the number of older carers 24.5.2013

Involve older people in framing the task

We recommend that future research on ageing should involve a range of older people to reflect the span of generations in framing the task from the very beginning, so that their concerns and priorities influence the choices made about the focus of the research and the balance of a programme.

It is very often the case that when those who are the objects of policy or of research (older people, disabled people, carers, young people etc) are asked for their concerns and priorities, these are often illuminating. They turn out to be significantly different from those defined by professionals, academics and policy makers. One example was the NHS National Service Framework for Older People, developed in 2000/2001 with older people involved from the start. Three of the eight standards set (to ban age discrimination, to help people stay healthy, and to fit services round the person rather than the other way around) were drawn directly from their contribution and continue to be relevant today.^{xxiv}

In framing any future programme of research, therefore, particular consideration should be given to two issues which have arisen in the context of the present programme: firstly, the role of older people as contributing members of society; and secondly, the dangers of playing into a 'deficit model' of ageing.

Recognise older people's contribution to society

There is a serious shortage of research on the contribution that older people make to wider society. The usual perception is that older people are takers, not givers, that they cost everybody else money, absorb too great a proportion of the nation's resources and are a drain on the welfare system and the NHS. The notion that the baby boomers have 'robbed the next generation of their inheritance'^{xxv} has been widely promoted by David Willetts and others. It is high time that there was a well-researched analysis of the alternative view, as highlighted in the Chennai research and in several other NDA research projects: that older people have made and continue to make a substantial contribution to society both in employment and retirement, though one which often goes unrecognised. Just like younger people, they lead normal rounded lives encompassing a variety of interests, roles and relationships and continue to do so into late old age.

Avoid a deficit model of ageing

Further, a number of the research projects in the current programme focus on illness or disability and efforts to overcome the impact of these on everyday life. These are valuable and important matters and older people will in all likelihood be the main beneficiaries of such projects. Nonetheless, most older people are not ill. The fact that people are more likely to suffer joint problems or poor sleep patterns or a hip fracture as they age does not imply that every older person does; nor are such conditions exclusive to old age. Research on ageing clearly cannot ignore issues of disability, illness or vulnerability, but at the same time age should not be equated with those factors. To do so would play into the hands of the very stereotypes that much research seeks to overcome.

xxiv HMSO, NHS National Service Framework 2001

xxv Willetts, D. 'The Pinch: How the Baby Boomers took their children's future', 2010

Enable public access to useful new tools and ideas

Finally, several research projects have come up with ideas and innovative solutions to problems that could make life easier or more enjoyable for many older people. How to improve the quality of sleep or the design of kitchens, the benefits of participation in musical activities and in local opportunities such as the theatre or gardening clubs, where to find the Great British Toilet Map and where to find clothing designed with older walkers in mind are all examples of useful information that should be easily accessible to the public.

Several of the research projects, especially if they have had follow-on funding, have been able to work with professional bodies, companies and voluntary organisations to make such information more widely available.

However, there is also a need for more direct access by the general public. Older people should be able to access these useful ideas directly through, for example, an online shop window for all the potentially useful findings, ideas and devices that have emerged from the New Dynamics of Ageing Programme and could emerge from other programmes in future. Such a shop window could be established through a partnership between the research community and a voluntary organisation such as AGE UK, whose target audience is older people, to make these benefits directly available to the public.



SECTION 3: The Research Projects

The sequence in which these lay summaries are presented is governed by the dates on which the research findings were produced. They have not been grouped by subject matter or any other organising principle. Full Findings documents and further information can be found on the NDA website: www.newdynamics.group.shef.ac.uk

1. Improving the diagnosis and treatment of mobility problems

This research project explored how visualising information from the scientific field of biomechanics could improve the diagnosis and treatment of mobility problems in older people and improve design.

Findings 1: Innovation in envisioning dynamic biomechanical data to inform healthcare and design guidelines and strategy

Alastair Macdonald, Glasgow School of Art; Catherine Docherty, Research Consultant, Journey; David Loudon, Glasgow School of Art.

The researchers created software which represents a person as a three-dimensional animation on a computer screen carrying out certain tasks, such as sitting down and getting up from a chair. A traffic light system revealed the degree of difficulty for the muscles to support joints: green where there is no difficulty through amber to red where there is a high degree of difficulty and danger of collapse.

Both older people and professionals in healthcare and design found the tool easy to understand and to use. Older adults recognised the way the images moved from their own experience; they were able to talk to healthcare professionals, designers and others about the impact of different movements on their joints, using the animations to illustrate what they meant. Health professionals found that the animations helped them to 'see' where mobility, muscle and joint difficulties were occurring; they found it easier to discuss this using the software, both with the older adults involved and with people from other professional groups. The prototype tool could be used by design specialists to test architectural and design issues and to understand better what makes for a 'mobility friendly' product and a more accessible built environment.

The researchers felt that the tool could be useful in assessment and diagnosis, in therapy and treatment, and in communication and education. It had good potential for development. Whole body movements and the difficulties associated with a wider range of tasks could be measured. Using the tool, it would be possible to monitor changes in people's mobility over time and to assess the effectiveness of treatments more accurately. Some potential obstacles needed to be overcome to extend its usefulness, for example, how best to capture data from individuals quickly and accurately and cheaply, and how to develop a portable version of the prototype. However, the research illustrated how designers, clinicians and patients could all make use of biomechanics information and how practice could benefit from this area of science. Subsequent discussions led to further research funding to explore the development and application of this tool.

2. Refining the tools to measure quality of life

Under the ESRC's Growing Older Programme, one research project developed a way of measuring older people's quality of life, based on their own views of what that constituted. This was known as the OPQOL (Older People's Quality of Life) questionnaire. This follow-up study, under the New Dynamics of Ageing Programme, tested that measure and compared it to others. It had a particular focus on minority ethnic older people and on how older people in general define active ageing.

Findings 2: Quality of life in older age: psychometric testing of the multidimensional Older People's Quality of Life (OPQOL) questionnaire and the causal model underpinning it.

Anne Bowling, D. Banister, P. Stenner, H. Titheridge, K. Sproston, T. McFarquhar;
University College London.

This project tested the reliability of the questions developed for the OPQOL questionnaire and found them unusually consistent, despite the subjective nature of the concept of 'quality of life'. OPQOL worked well for both the older people as a whole and for the ethnically diverse samples of older people.

There were distinct differences between the minority ethnic elders studied and the general population. The minority ethnic elders were mostly younger than white British respondents but had poorer health. They were much less likely to live alone, and had more relatives but fewer friends. Nearly three quarters of them reported poor quality of life, a much higher figure than for the respondents as a whole.

Older people defined active ageing in terms of physical and mental health, fitness and exercise, social activities and participation, independence and mobility. Most people (80%) engaged in social activities but only a third engaged in physical activities. Only 40% of the minority ethnic sample said they were ageing actively, compared with 85% of the wider sample. Older Chinese people reported ageing more actively than Pakistani, Caribbean or Indian people.

They were asked how they coped with challenges in their lives. They said they relied on their own psychological outlook (acceptance, getting on with life, keeping a sense of humour); on keeping socially active and seeking informal support; and on adapting to changing capacity and circumstances.

3. Checking on mobility

Mobility is a key aspect of active ageing; this study sought to determine the significance of mobility in 'successful ageing'.

Findings 3: New metrics for exploring the relationship between mobility and successful ageing.

Lynn McInnes, Pamela Briggs, Linda Little, Northumbria University and Lynn Rochester, Newcastle University

The objectives of the research were to examine the relationship between mobility, health and lifestyle and to test the use of new technology to monitor mobility. The participants were part of a 25 year longitudinal study of ageing, were aged between 72 and 92 and were generally in good physical and mental health.

Participants were asked to keep a diary of what they did and to wear an accelerometer strapped to their thigh for a week to measure physical activity. They also wore a tracking device (based on a GPS system) to map their movements. They completed gait and balance assessments and intelligence tests and answered a range of questions about their health, lifestyle and activities.

The study found that the subjects were only moderately active, with 70% of the day spent sitting or lying, 22% spent standing and 7% walking. Most time was spent on sedentary activities (63%) and most of the day was spent indoors (78%). They tended not to travel far from home, taking short trips several times a week. Younger and slimmer people were more mobile, while balance was important in determining how far someone walked and how active they were outdoors.

The participants did not much like the tracking devices. They did not see the point of them and felt they were intrusive and stigmatising. The researchers felt that the design needed to be improved. They concluded that mobility remains a key issue for older people, including those in good health who have 'aged successfully' and suggested that mobility monitoring could help to encourage healthier lifestyles and predict potential health problems.

4. Designing for an ageing population

Designing towns and cities for an ageing population is increasingly important and a challenge for planners and architects. This study set out to examine how older people navigate their way around places that are unfamiliar to them.

Findings 4: Older people's use of unfamiliar space.

Judith Phillips, Swansea University; Nigel Walford, Kingston University; Nigel Forman, Middlesex University; Ann Hockey, Anglia Ruskin University; Mike Leis, Swansea University; Edgar Samarasundra and Mark del Aguila.

This research explored the strategies older people adopt to navigate around familiar and unfamiliar spaces, as drivers, as pedestrians and as passengers on public transport. A variety of methods were used to elicit responses from the 44 older people involved and to measure their comfort or discomfort with their environment. The research included the use of a virtual reality 'cave' and a visit to an unfamiliar town.

The research concluded that memories play a part in knowing one's way around a familiar environment. Older people took account of the whole environment, beyond what they can actually see, when talking about an area they know. Pedestrian friendly areas were a significant factor in enabling older people to remain in their own communities, while poorly lit or run down streets and busy, noisy or crowded areas were avoided.

Most people spent time preparing for visits to unfamiliar places. They were as good as or better than younger people at navigating using a map or hand held navigation aid. They relied on landmarks, most often churches or other distinctive buildings, to avoid getting lost, but also used signs and maps. Street signs were useful, but only up to a point, as they were often badly positioned and rarely gave an indication of distance, so that it was unclear how far people were expected to walk. Looking out for signs in unfamiliar places was difficult for both drivers and pedestrians; signs for drivers were often inappropriate for people on foot and vice versa. In unfamiliar places, people were unsure how to negotiate shared space such as pavements with obstacles.

The research highlighted the importance of consultation with older people in planning outdoor spaces. While planners were aware of the need to make public spaces 'older person friendly' and to ensure access to seats, bus shelters and public toilets, the research concludes that they need to take into account the great diversity of older people and their widely differing needs. Walking routes and 'travel chains' that ensure a smooth transition between walking, driving and public transport are important. Places have historical meaning, which adds to character and ambience, and older people can contribute to that understanding.

5. Tackling poverty and discrimination amongst the urban poor in India

This study followed up earlier research on older people living in slum areas in Chennai, India. It finds that older slum dwellers play a significant role in the urban economy, but the state fails to recognise this. The research findings from this study have been widely disseminated at local, national and international level, to encourage policy makers to highlight ageing as a priority issue in anti-poverty work.

Findings 5: Ageing, poverty and neo-liberalism in urban South India

Penny Vera-Sanso, Birkbeck College; V. Suresh, M. Hussein, K. Saravanan and S. Henry, Centre for Law, Policy and Human Rights Studies, Chennai, India; Barbara- Harris White, HelpAge International

The circumstances of poor older people in Chennai, India (formerly Madras) have worsened between 1990-91 and 2007-2010, a period during which neo liberal policies of free markets, privatisation and deregulation have been in force.

Older people play a significant productive role in the urban economy but the state fails to recognise their contribution, their needs as workers and their rights as citizens. Instead it assumes that older people are dependent on their families. In fact, however, older people continue to support themselves and their families through paid work, through unpaid work in a family business or by taking on domestic and child care responsibilities and releasing younger women for the labour market.

Poverty in old age is an increasing though unacknowledged problem. The changing nature of employment results in a segregated labour market, with middle aged and older people concentrated in the least well paid and least secure work. Age discrimination, low incomes and no or meagre pensions mean that slum dwellers work into late old age.

The research found that older people's work often goes unrecognised, even by themselves. Only a minority describe themselves as working but a survey of five slums found that they are involved in over forty occupations in four main roles: as petty vendors of agricultural produce; as paid and unpaid cleaners, child-minders, and cooks; by providing low cost services and materials to local industries; and by providing cheap services to the workforce.

Men and women are affected differently, though all suffer the consequences of a lifetime of poverty. Male slum dwellers have high rates of chronic ill health and disability and can expect increasingly irregular access to work and falling incomes from their late 40s onwards. Women rely on street vending and paid domestic work and undertake paid work over and above their domestic responsibilities, often supporting their husbands and families into late old age.

State policies on ageing and social welfare fail to understand the real dynamics of old age poverty. The pension is valuable because it is regular, makes older people credit worthy and ensures that they do not become a burden on their families, but it is low, can only supplement incomes and it is not available to many of those who should qualify. The policy of evicting slum dwellers and relocating them in undeveloped locations without recourse to work, transport, or medical and other facilities only deepens poverty and puts a strain on family and social bonds.

The researchers found that stereotyping and age discrimination underlay much existing economic and social policy. In situations of extreme poverty, they conclude, welfare measures should be approached as an integrated system, since measures aimed at one generation impact on others. They recommend that age issues be mainstreamed across the policy arena, and that the cumulative impact of poverty over a lifetime should be addressed directly.

6. Measuring wellbeing in developing countries

The research aimed to throw light on the links between ageing, well-being and development over time and across countries. It set out to contribute to shaping policy on ageing in countries which were having to adapt quickly to changing demographics.

Findings 6: Ageing, wellbeing and development: a comparative study of Brazil and South Africa.

Armando Barrientos, University of Manchester; Peter Lloyd Sherlock, University of East Anglia; Joao Saboia, Federal University of Rio de Janeiro; Valerie Moller, Rhodes University; Julia Mase, University of Manchester; Astrid Walker-Bourne, HelpAge International.

The study tracked changes in well-being amongst lower income households which include older people in both Brazil and South Africa, and studied the impact of different social policies on them. A survey of 1000 households was undertaken in both countries in 2002 and these households were revisited in 2008. The survey provided information on demographic and socio-economic status, household dynamics, livelihoods and quality of life. Thirty in depth interviews with the oldest participants were also conducted in each country, and policies in each country were examined.

In low income households in both Brazil and South Africa, older people's well-being and livelihoods were closely linked with those of their extended family, whether or not they lived together. Those older people who could afford to do so made a large financial contribution to their households and communities.

On average, the well-being of older people in Brazil and South Africa improved between 2002 and 2008. Getting older did not mean that well-being declined, rather the reverse. Household income in both countries showed a lot of movement over the course of 6 years. In South Africa, one sixth of poor households had improved their incomes, but nearly a third of households had fallen into poverty. In Brazil, one in five households was no longer below the poverty line, but one in twenty had fallen below it. Brazil had seen a substantial rise in pension levels and an improved economy and had introduced low interest loans for pensioners. However, a quarter of Brazilian households did not have access to necessary medication, compared to only 3% of South African households.

A majority of older people in both countries felt satisfied or very satisfied with their lives, though more of those in Brazil were satisfied than in South Africa. Family relationships and the respect they received from others were key factors. For low income households, pension income, especially non-contributory pension income, was essential to well-being. Without it, households with older people were likely to be significantly poorer, less resilient and less integrated economically. However pensions alone were not enough; they needed to be complemented by policies aimed at other aspects of wellbeing.

Other dimensions of social policy, such as disability benefits and policies aimed at alleviating child poverty, also had a positive impact on the well-being of older people. The study concludes that economic performance, labour market conditions and social policy all influence older people's well-being in developing countries. Per capita income should be combined with other indices, including satisfaction levels, to assess levels of well-being. The two countries studied provided a contrast, and demonstrate that there is no single model for addressing ageing issues in disadvantaged settings.

7. How professionals respond to suspected financial abuse

This study examined how professionals in health, social care and banking made decisions when they suspected that an older person's money was being mishandled. The research identified the cues that trigger suspicions, the kind of decisions that are made, and the factors that make decisions difficult. It highlighted the lack of clear policies on financial abuse.

Findings 7: Decision making in detecting and preventing financial abuse of older adults.

Mary Gilhooly, Priscilla Harries and Ken Gilhooly, Brunel University; Catherine Hennessy and Tony Gilbert, University of Plymouth; David Stanley, Northumbria University; Bridget Penhale, University of East Anglia; Deborah Cairns, Miranda Davies and Libby Notley, Brunel Institute of Ageing Studies.

Making a decision about what to do when faced with the suspected financial abuse of an older person is complex but has been little studied. In this research, health and social care professionals and bank staff were presented with a series of case studies and asked which features were most influential in deciding whether abuse might have occurred. The two groups used somewhat different cues. They both took account of the person who identified the abuse and the nature of the financial problem; health and social care staff also noted the mental and physical capacity of the older person, while bank staff noted who was in charge of the money. Both sets of staff encountered situations where they were uncertain about what had happened, for example where there was simply little money for necessities or where an account was unexpectedly overdrawn.

The greater the certainty that abuse had occurred, the more likely the participants were to take action. Actions ranged from doing nothing to contacting the police, implementing safeguarding procedures or acting to protect the customer's finances. Decision making was not always straightforward and other considerations could have an influence, such as problems with policy and legislation or the likely consequences of raising the alarm. There was, however, a high level of consistency in the decision making.

The study also examined policies and guidelines on financial abuse and assessed whether they matched up to real situations. The researchers found that there was little guidance on financial abuse and how it should be dealt with. Policies for health and social care staff were based on government guidance on elder abuse generally ('No Secrets'). Policies in banking had restricted circulation and did not seem to address financial elder abuse explicitly. While the profile of financial abuse had risen in recent years, existing policies and procedures appeared to treat it as of secondary importance. The effectiveness of differing safeguarding procedures had not been evaluated and there seemed to be no information on the long term effects of financial abuse on victims. Defining abuse in the context of trust and human rights threw up other issues: for example, abuse could be unethical but not illegal. It could be difficult for cases to reach the threshold for prosecution as a criminal offence and proving abuse in a court of law could be difficult.

8. Maintaining dignity towards the end of life

Health problems in later life can lead to a loss of independence, identity and dignity. The support and care of others then becomes crucial. Thirty four older people gave accounts of the changes in their everyday lives and what promoted or undermined their dignity.

Findings 8: Maintaining dignity in later life: a longitudinal qualitative study of older people's experiences in support and care.

Dr. Liz Lloyd, University of Bristol; Professor Michael Calnan, University of Kent; Ailsa Cameron, University of Bristol; Professor Jane Seymour, University of Nottingham; Professor Randall Smith, University of Bristol; Dr Kate White, University of Bristol.

The 34 participants in this study were mostly in their 80s; they were interviewed several times over a thirty month period. They had a range of illnesses and disabilities common to this age group.

Most regarded the onset of illness as the point when they started to feel old and life became less predictable. They talked about their loss of mobility, strength and confidence, and the loss of activities that had been an important part of their lives, such as driving, gardening, or cooking. Most felt these losses keenly but tried to be philosophical about it.

Adapting to illness and disability took physical, mental and emotional effort but enabled them to retain agency over their lives. Some people found new activities or adapted old ones. All made great efforts to maintain their health, staying physically and mentally active as far as possible and attending multiple medical visits. Loss of self-reliance was hard to accept and was often seen as leading to a loss of dignity. Being as self-reliant as possible was seen as a moral obligation, but it was also important to 'be sensible' and accept help when necessary.

The respondents were well aware of living in a precarious and unstable situation, with further change ahead. They did not find it easy to talk about the future or the proximity of death, though many had made wills and some had made funeral plans, end of life treatment plans or established powers of attorney. A few talked about their desire to 'end it all' and wished health professionals could help.

Most participants were very involved in family life and had contact with friends and neighbours. Family help was not all one way; older people provided financial help to children and grandchildren, and it was important to them to talk through major decisions with family members. Feeling that someone cared about them was very important.

Needing help with personal care from strangers was often dreaded, though most people found it not as bad as they had feared. Much depended on how help was given and whether privacy and individuality were respected. Most of the respondents were 'on the whole' satisfied with how they were treated by health and social services but the researchers identified twenty two examples of rude, hurtful or neglectful behaviour. The older people greatly appreciated staff who offered appropriate help without being asked, who were kind, thoughtful, courteous and respectful, and who treated them as intelligent, unique individuals. Being helped at the right pace was important, as was being offered help to make difficult decisions with honesty and respect.

In summary, late old age was found to be a complex and demanding stage of life, physically, mentally and emotionally. Health problems posed challenges to people's identity and sense of self and could erode their dignity. Thoughtless or unkind behaviour exacerbated loss of dignity, whilst sympathetic and respectful care helped to maintain it. Participants in the study worked extremely hard to maintain their independence, while coming to terms with growing dependency.

9. Making music is good for you

Making music, instrumental as well as choral, enhances quality of life, presents new challenges and creates opportunities for social and intellectual engagement. Opportunities for older people to make music, at all levels of expertise, should be made available locally.

Findings 9: Music for Life project: The role of participation in community music activities in promoting social engagement and well-being in older people.

Susan Hallam, Institute of Education, University of London; Andrea Creech; Helena Gaunt; Anita Pincas; Maria Varvarigou; Hilary McQueen.

Little research has been done in the UK on the role of music in the lives of older people. The aims of this study were to explore how creative music-making enhances older people's lives and to consider its impact on their social, emotional and cognitive well-being.

Three sites, one in Gateshead and two in London, participated in this research. Musical activities included singing in large and small groups, rock groups and classes for guitar, ukulele, steel pans, percussion, recorder, music appreciation and keyboard. Two different scales and one combined scale were used to measure quality of life. Those involved in making music scored higher in some aspects of quality of life but not all, when compared with those attending language classes, art and craft classes, yoga, social support, a book group and a social club. In the music groups there was no decline in the quality of life over the nine months of the programme. Those over 75 scored as well as those under that age on most but not all of the factors measured.

Both groups rated the benefits of group participation highly. They noted that such participation sustained wellbeing and quality of life; enabled them to acquire new skills; provided mental stimulation and social involvement; enabled them to demonstrate their skills and to help others, and helped them maintain their physical health. They noted social, cognitive, emotional and mental benefits. Intergenerational activities too were enjoyable and beneficial for both children and adults.

The facilitators saw benefits in working with older people and felt they had learned from the experience. They aimed to offer a balance between enjoyment and challenge. Repertoire was important; older people enjoyed music familiar to them and rejected anything childish. The facilitators stressed the need for inclusive teaching methods and a welcoming atmosphere. They each had different styles of working but all felt it was important to work towards a performance.

10. Challenging the representation of older women

This study set out to challenge media images of older women through a variety of participatory visual approaches.

Findings 10: Representing Self – Representing Ageing. Look at me! Images of Women and Ageing

Lorna Warren, University of Sheffield; Merryn Gott, University of Auckland; Susan Hogan, University of Derby; Naomi Richards, University of Sheffield; Clare McManus, Eventus; Rosy Martin.

The study involved participants in exploring how media and cultural representations of older women play a subtle but profound role in shaping the experience of ageing. Visual methods were used to understand their everyday experiences. The aim was to create new images to counteract the invisibility of older women and the usual stereotypes (such as those presented by the anti-ageing industry) and to represent instead older women's 'contributions, strengths and resourcefulness' (UN 2002).

There were three projects, using different approaches and methods. They resulted in three local exhibitions.

A professional photographer took a series of humorous 'before and after' photographs of one group of women, which parodied the 'youthful' glamour in make-over shows. Another photographer took more formal photographs with another group, representing the reflective side of their lives, and tableaux with more muted colours. In two workshops, women created their own images which allowed a wide range of themes to emerge, such as requirement to conform, invisibility, the changing self over time, and family history. Some women wanted to look 'good for their age' while others preferred to demonstrate character, purpose and their engagement with the world. A phototherapy workshop allowed women to explore their own daily lives or their early life experience and its influence as they grew older, and to play chosen roles. Many of the images captured the women in flamboyant attire and an energised, playful and uninhibited mood, while others represented aspects of ageing not usually captured in the media, such as fear of contracting horizons.

Analysis of the findings revealed that the younger ('third age') women were far more conscious of being stereotyped, misrepresented or absent from media images than those in the oldest age groups. However, all of them wanted to see more images of 'ordinary', 'real' or 'natural' older women, with a variety of body shapes. They wanted to see represented a sense of continued involvement in public life and enjoyment of life and friendships.

Those who participated in the study experienced a variety of positive outcomes, both personally and socially. The images generated by this study were displayed in a number of settings. Comments from visitors to the exhibitions expressed appreciation and a desire to see more such images. Findings from the project have been used to inform policy recommendations on health and ageing, and on the representation of older women.

11. The importance of good sleep

Good sleep is necessary for the well-being of older people and for their ability to be fully active during the day. Ageing per se does not cause poor sleep. In this research, various strategies were explored to improve the sleep of older people in the community and in care homes.

Findings 11: SomnIA – Optimising quality of sleep among older people in the community and care homes: An integrated approach

Sara Arber, University of Surrey; David Armstrong, Kings College London; Ingrid Eyres, University of Surrey; Kevin Morgan, Loughborough University, Roger Opwood, Bath University; Debra J. Skene, University of Surrey.

This study is made up of several linked research projects examining aspects of sleep, the consequences of poor sleep and ways of improving sleep patterns.

The researchers say that good sleep should be considered a key objective in health promotion. In some countries, including Britain, increasing age is associated with worsening sleep, while in others it is not. Worry and socio-economic disadvantage both affect sleep, though less so in later life.

Many older people developed strategies to deal with poor sleep. They expected the quality of their sleep to decline as they aged but the effects of health problems and of their medication should be ruled out first. Older people often did not ask their doctor about sleep problems because they did not want to take sleeping pills. The research found that taking a nap can be beneficial in order to keep active during the day, though long or frequent naps affected the quality of night time sleep.

In ten care homes studied, the sleep of residents was affected by patterns of night time care, staffing levels, daytime activities and the care home routines. Care homes should be seen as 24 hour care environments, and equal importance should be given to night time as to daytime care practices. The researchers found that care home residents had more disturbed sleep than people at home: they spent long hours in bed, often had little choice about when they go to bed and were disturbed by routine monitoring by staff at night.

Changes in the eye meant that older people needed more light to co-ordinate their body clock and their sleep-wake cycle. Bright light, especially blue light, during the day enhanced daytime alertness which in turn reduced sleep problems at night. Spending time outside and increasing the illumination inside improved sleep-wake patterns and activity levels during the day without adverse effects.

Self-help techniques for managing one's own sleep patterns proved popular with older people and were successful in improving sleep in a number of ways over a six month period (though not the fatigue associated with chronic illness). Most older people said they would recommend the techniques to others. The research concludes that providing a set of six weekly self-help booklets should be considered for all patients experiencing insomnia.

New technology could also help to facilitate sleep, especially in care homes. Four ideas were assessed: a night time tray that contains needed items and illuminates on contact; a 'musical' pillow; automated background lighting; and a hand held communicator for those who use a hearing aid. All four were well received and felt to have potential.

12. Reducing the impact of continence difficulties

This research tackled several different issues associated with incontinence, including the availability of public toilets, the quality of continence services and the potential of assistive devices to help people manage incontinence.

Findings 12: Tackling ageing incontinence through theory, tools and technology (TACT3)

Eleanor van der Heuvel, Mary Gilhooly, Ian Sutherland, Felicity Jowitt, Kevin McKee, Lena Dahlberg, Stuart Parker, Patrick Gaydecki, Norman Ratcliffe, Jo-Anne Bichard, Adele Long, Nikki Cotterill, Susie Orme.

Incontinence is not a direct consequence of ageing, but it is common: 70% of people aged over 40 suffer some urinary problems. Urinary incontinence affects 55% of women and 15% of men aged 65 and over. Continence difficulties can have far reaching effects, affecting confidence and wellbeing. The aim of this research was to reduce the impact of continence problems for older people. Patients, professionals, the public and toilet providers were all asked for their views.

The research concluded that adequate toilet provision outside the home was essential if older people were to stay active and involved in community life. Cleanliness, functionality and improved technology were all seen as key aspects of good toilet provision. Toilets were currently provided by local authorities, as part of the transport infrastructure (in bus and railway stations), and in cafes, pubs and restaurants. Maintaining these facilities at a high enough standard and making sure that they were not misused could be expensive. The closure of public toilets was a concern but this project showed that publicly accessible toilets were available although information about them was often missing, difficult to find or out of date. The researchers developed the Great British Public Toilet Map, which uses data provided by local councils to provide accurate and up to date information on publicly accessible toilets. The map also acts as a campaign tool and a reference so that planners and public alike know where toilet provision is lacking (<http://greatbritishpublictoiletmap.rca.ac.uk>).

The research also examined the quality of continence services. Older people said that the accessibility of continence services, their relationship with professional staff and how far the impact of incontinence on everyday life was reduced were all important. Professionals identified patient education, a welcoming environment and involving patients in decision-making as important. Continence service managers also emphasised referral pathways, patient assessment regardless of age, individual assessment and investment in service capacity. Ageist beliefs and attitudes about incontinence were still evident and needed to be addressed, as well as collaboration with other services.

Two kinds of assistive devices for continence pad users were developed through the research project: smart underwear that could detect leakage and give an early warning and a colour change odour detector that would reassure worried pad users. The smart underwear was welcomed but needed further refinement for some users, while the odour detector was thought to be a very good idea but needed testing in real life situations.

13. Designing age-friendly kitchens.

This research explored how people used the kitchen at different periods in their life. It went on to identify the difficulties that older people face in using their kitchen today and how these might be overcome with better design.

Findings 13: Transitions in kitchen living.

Sheila Peace, John Percival, the Open University; Martin Maguire, Colette Nicolle, Russ Marshall, Ruth Sims, Clara Lawton, Loughborough University Design School.

Oral histories taken from older adults illustrated the uses to which the kitchen was put in the past and how this has changed over time. The childhood homes of today's older people pre-dated central heating; the kitchen was the warmest room in the house and the centre of family activities. There were sometimes allied spaces such as sculleries or back kitchens in which to do laundry and larders where food was stored in a cool place. The kitchen in which today's older people had raised their families had been sparsely furnished initially, though new appliances were acquired over time. The kitchen was mostly the woman's domain. Meals were taken there until social etiquette changed and the dining room became popular. The kitchen remained important in the homes of older people today as a room in which 'everything happens'.

Forty eight older people with a range of physical disabilities (including sight and hearing problems, movement difficulties and problems with dexterity) discussed kitchen layout, design and equipment. They reported a wide range of difficulties, such as reading instructions in small print and cooker controls; poorly lit surfaces, in both daylight and electric light; difficulty hearing when other noise distracts and difficulty reaching or stretching for high or low cupboards or oven shelves.

Many people used special gadgets to overcome limitations in dexterity, movement or strength, though lifting a heavy dish remained a problem. The main physical barriers to preparing food were pain, lack of strength or difficulty standing. Washing, drying and ironing clothes presented problems, as did kitchen cleaning and recycling. However, people developed their own coping strategies to get tasks done. They had many ideas for improving the design of kitchens and appliances: more plugs better placed; better targeted lighting; ovens, floors and surfaces that were easier to clean; more accessible shelves and cupboards, and contrasting colours that were easier to see.

A further study explored the response of older people to a 'Smart Kitchen'. They welcomed many kinds of technological support, especially those that improved safety or dealt with immediate problems. Popular features were automatic turn off of electrical appliances, flood warnings, a quick cooling hob, remote control of blinds and windows, being able to raise or lower the worktop, sink or cupboard and a device for reading out small text. The research concludes that kitchens need to be designed to be truly flexible so that they can meet changing needs as people get older.

14. Mapping the future pattern of the older population and its circumstances

This research sets out to project the size and health of the older population over the years to 2030, along with likely family arrangements and resources, in order to estimate future demand for public expenditure on pensions and long term care.

Findings 14: Modelling Ageing populations to 2030 (MAP2030)

M Murphy, RD Wittenberg, A Comas-Herrera, JN Malley and LM Pickard, London School of Economics and Political Science; E Grundy, University of Cambridge; R Hancock, University of East Anglia; JEB Lindesay, University of Leicester; C Curry, Pensions Policy Institute.

The research examined the growing size of the older population over the next two decades, its financial, health, family, household and social resources, and its likely need for care.

In this research, options for pension and for long term care policy were considered together for the first time. The research concludes that mortality forecasting is less reliable than previously thought. Older people continue to prefer independent living to care homes. There is likely to be a 50% rise in demand for care by older people from their adult children, but only a 20% rise in the number of family members available to provide such care. The generations are becoming stretched as settling down and child bearing take place later, while families are more complicated, and can include step children, half siblings and former partners. Today's 70 year olds tend to have partners and living children but this will be less likely by 2030. Most of the extra life expectancy will probably be free of disability but the number of years with a disability is also likely to increase. A 10% reduction in the impact of major diseases is feasible but taking preventive action would incur a cost. A third of women and a quarter of men in residential care spend three years or more there.

Public expenditure on long term care is expected to rise from 0.9% of GDP to 1.65% in 2032. If private expenditure is included, the cost of long term care rises to between 1.6% and 2.7% of GDP, and more if life expectancy increases faster. Public expenditure on the state pension and other benefits is likely to rise to 5.9% of GDP or higher. If free personal care were introduced, the cost to public funds in 2032 would be £5.4bn and the greatest beneficiaries would be wealthier old people. Disregarding housing assets in the means test for residential care would cost £1bn in 2032 but the benefits would be more evenly spread across lower income groups.

The researchers conclude that chronic diseases are becoming more prevalent, which will lead to greater demand on the care system. Programmes to prevent disease and to delay its disabling consequences are required.

Given the uncertainties about mortality rates, disability rates and the ability of families to provide care, policies on pensions and long term care need to be flexible. Public expenditure on pensions and long term care is likely to rise substantially as a proportion of GDP over the next twenty years. Proposals for reform to the care system should consider not only costs and benefits but also which section of the population these would affect. There will also be greater demand for family carers, both spouses and adult offspring, whose needs should be explicitly considered.

15. Representing age in the theatre

This project used the unique experience of the social documentaries developed by the Victoria Theatre in North Staffordshire, later the New Vic, to explore the experience and perceptions of ageing amongst both older and younger participants.

Findings 15: Ages and Stages: the place of theatre in representations and recollections of ageing.

Miriam Bernard, David Amigoni, Lucy Munro, Michael Murray (Keele University); Jill Rezzano, New Vic Theatre; Michelle Rickett, Ruth Basten, Tracey Harrison (Keele University).

This project examined how age and ageing have been represented in the social documentaries which the local theatre in the Potteries, the New Vic (formerly the Victoria Theatre) produced between the mid-1960s and the mid-1990s, and the role the theatre has played in nurturing the community's view of itself. Researchers worked in the theatre's archive; interviewed volunteers, audience members, sources for some of the original documentaries, employees and actors; and produced a social documentary called 'Our Age, Our Stage' and an 'Ages and Stages' exhibition based on their findings. A number of key themes emerged.

In interviews, the theatre, well embedded in its local community, was seen as a comfortable place to be, where visitors were 'part of the family'. It also offered challenge and opportunities to develop and change. The theatre appeared to be particularly important at times of transition in later life, such as retirement or widowhood. It offered continued social engagement and a sense of being valued. The documentaries produced by the theatre, based on local history and local industries, played an important role in celebrating the area, bringing people together and consolidating their relationship with the theatre. Some interviewees had been involved in the theatre in creative roles and benefitted from this, though many had ceased their involvement as they got older. Interviewees also associated their theatre involvement with improved well-being, confidence and vitality.

The new social documentary developed during the course of the project, 'Our Age Our Stage', explored ageing, intergenerational relations and the role the theatre has played in the creative life of people in the area. Both older and younger participants identified a range of benefits. These included new friendships, increased understanding between the generations, discovery of new passions, perceptions and interests, more positive views of ageing, increased confidence, new skills and broadened horizons.

A follow-on project established the 'Ages and Stages Company', created and toured a new interactive theatre piece, developed and ran an inter-professional training course and assessed the potential for a 'creative age' festival in Stoke on Trent and North Staffordshire.

16. Designing for ageing members of different populations

This research set out to see how new digital technologies could enhance the quality of life of two groups of older people living in communal circumstances. It found that, for design to be successful, researchers needed to work closely with residents and design for the whole person, their humanity and their interests.

Findings 16: Landscapes of cross generational engagement

Peter Wright, University of Newcastle; William Gaver, Goldsmith University of London; Mark Blythe, Northumbria University; Andy Boucher; John Bowers; David Cameron; Nadine Jarvis; Toby Kerridge; Robert Phillips; Alex Wilkie.

In the face of an ageing population, governments tend to encourage older people to stay in their own homes; this research explored instead the possibility of making communal living better than staying at home, recognising that conviviality and spirituality are central to our humanity. It set out to determine how new digital technologies could enrich the experience of older people living in communal circumstances. Two groups of older people (80 plus) participated, one in a care home and one in a convent. Designers worked closely with residents over long periods to design and refine the devices.

Two different devices were developed over a period of 30 months: a Photostroller and a Prayer Companion. The Photostroller displayed slide shows controlled by the resident. The prayer companion for the convent presented news feeds and blog extracts to support the nuns' prayers of intercession; it received international attention.

In the care home, it was initially difficult to engage with residents due to their physical and mental limitations. Eventually, however, the researchers invited local artists and school children into the home to take photographs, paint portraits and read poetry with the residents. This was a major success and resulted in two local exhibitions.

The researchers identified several general lessons. Firstly, one should design not for an ageing population but for ageing members of many different populations. Secondly, the focus of the design should be on the human values and experiences of the participants, not merely on overcoming their functional limitations. The different devices engaged people's differing interests and activities. Design needed to be tailored to particular communities and to remain straightforward. The appearance of the devices mattered if they were to be acceptable.

The designs resulting from this research were simple, easy to use and fitted in with daily life. They provided a window on the world and enhanced the quality of life of those who used them. The design process had benefited from engaging in dialogue with residents, building trust and valuing the whole person and their relationships.

17. Encouraging healthy lifestyles amongst Bangladeshi women in Britain

Older Bangladeshi women living in Britain have poorer health than the general UK population, particularly with regard to conditions relating to diet such as obesity and type 2 diabetes. Migration has had an impact on many aspects of nutrition, access to physical activity and views on ageing.

Findings 17: Migration, Nutrition and Ageing across the Lifecourse in Bangladeshi Families: A Transnational Perspective (MNA)

Janice Thompson, University of Bristol; Barry Bogin, Loughborough University; Vanja Garaj, Brunel University; Michael Heinrich, University of London School of Pharmacy; Petra Meier, University of Sheffield; Joy Merrill, Swansea University; with Fateha Ahmed; Nabila Ahmed; Jusna Begum; Runa Begum; Shelina Hurt; Sofina Khatun; Farida Khatun-Miah; Rehana Miah; Bablin Molik, Shaheena Nahar Omar. Consultants: Katy Gardner, Sussex University; Christina Victor, Brunel University.

Bangladeshi women in Britain have relatively poor health, in which issues around nutrition play a significant part. This project examined the complexity of their nutritional status, food practices, beliefs and experience of ageing in order to develop culturally appropriate interventions.

The researchers aimed to understand the impact of migration on nutrition and health amongst first generation immigrant Bangladeshi women in Britain and on their second generation daughters, and how these compared with those of women who had remained in Bangladesh. 63% of the older women living in Britain were married and the rest widowed. Amongst their daughters, nearly 60% were married, 35% were single and two were divorced. In Sylhet, 68% of both mothers and daughters were married, the remaining mothers were widowed and the remaining daughters single. Half lived in large multi-generational families, with half living in nuclear family households. Women living in the UK, especially older women, had higher rates of obesity, due to dietary patterns and lower levels of activity. There were fewer opportunities for physical activity and social interaction outside the home in the UK.

Older women in the UK received their dietary information from health professionals and family members, who played an influential role in food choices. Daughters accessed wider sources such as the Internet. There was a need for bilingual sources of information, particularly for health promotion, in spoken Sylheti rather than in written Bengali, due to limited literacy. Using plants as food medicine was fairly common amongst older women (but not amongst their daughters), with an interest in the cultivation of vegetables and herbs.

The research concluded that there was a clear need for better access to appropriate physical and social activities for women from the Bangladeshi community in the UK. Dietary advice needed to be tailored appropriately for communities who eat communally, rather than by individual 'plate', and the healthy aspects of Asian foods needed to be promoted. In the UK, it is daughters, rather than, as traditionally, sons and daughters-in-law, who tended to assume responsibility for ageing parents, but geographical mobility may well make this increasingly difficult, with resulting implications for health and social care services. The outcome of this research was widely disseminated, including to members of the Welsh Assembly Government.

18. Participation, the key to healthy ageing

Older people, especially those living in poor areas, report feeling isolated and socially excluded. They stay physically and mentally healthier if they are involved with others and doing something purposeful.

Findings 18: Call-me: Promoting independence and social engagement among older people in disadvantaged communities.

Michael Murray, Roger Beech, Sian Maslin-Prothero, Tom Scharf, Friederike Ziegler, Amanda Crummett, Jan Bailey, Sharon Middling, Amy Bennion, Tracey Harrison and Kim Rawlinson; Keele University.

This project worked with groups of older people and Manchester City Council to generate local activities in several inner city neighbourhoods. The researchers wanted to find out what older people thought would help to promote active ageing, to assess the impact of different approaches and to identify the social and psychological processes involved.

Older people involved in the project already had fairly good social support but they wanted more and reported that they often felt lonely. The project highlighted the nature and extent of social isolation and the importance of interdependence between older people.

A range of social activities were developed with older people, including arts projects, gardening projects and exercise classes. Groups were formed, facilitated by the researchers, who kept detailed records of the activities and encouraged participants to reflect on the impact these had on their lives. Public meetings were held and newsletters were produced to widen local interest. A broader range of local residents, including local councillors and journalists, took part in the public events such as art exhibitions and gardening competitions.

The researchers found that the social and physical environment in which they live partly determines how active older people are able to be. Poverty, poor services and fear of crime deterred involvement and prevented some people from contributing to public life. Nonetheless, people were very attached to their neighbourhood, identified closely with it and did not like it being labelled as 'deprived'.

The past history and experience of individuals was also significant: many residents of poor areas had experienced a lifetime of social exclusion and limited opportunity. Some older people, including men and those from ethnic minorities, were particularly socially isolated but were not always willing to take part in group activities. Many people were anxious about engaging in unfamiliar social events, especially outside their own community and age group.

Generally, participants were keen to get involved in local activities, though some were anxious about taking on a leadership role. The group facilitators had an important enabling and supportive role. Gardening, art and exercise were each attractive activities and they catered for different people. Successful projects were those where older people had control over the activity. The support of local people beyond the immediate project, and of local organisations and venues, were important to success. Older people who took part in the groups also participated more in other public activities beyond their immediate neighbourhoods.

Participants appreciated the benefits of participation and were worried whether there would be continuing human and financial support for the activities that had been developed. They were prepared to carry on with the groups after the researchers had left but ongoing support was needed to ensure that the local projects could be continued. The researchers concluded that continuing support from hands-on facilitators and long term funding were both needed in order to generate more social interaction in disadvantaged neighbourhoods.

19. Monitoring the ageing of the cardiovascular system

This research developed a way of measuring blood flow through the capillaries and thereby monitoring the health of the endothelium, the inner lining of the blood vessels.

Findings 19: Dynamics of cardiovascular ageing

Aneta Stefanovska, Peter V.E. McClintock, P.Jane Owen-Lynch, Dmytro Latsenko, all of Lancaster University; Dr Peter Clarkson, NHS Highland; Dr Alan Bernjak, University of Sheffield.

Our bodies change as we age. This research studied the changes that occur in the cardiovascular system, the heart and lungs and the network of arteries and veins that carry oxygenated blood and nutrients to the cells and remove waste products. The rate of breathing affects the rate at which the heart beats, though this effect decreases as we age. By measuring the responsiveness of the endothelium to a chemical stimulus, the researchers were able to study the ageing of the cardiovascular system.

The research suggested that what governed the interaction between heart and lungs was the health of the inner lining of the blood vessels, the endothelium. As people age, the cardiovascular system begins to function less effectively as a single entity and the way in which blood vessels in the skin react to a chemical stimulus changes. By measuring this, the researchers were able to measure the health of a subject's endothelium and estimate their 'endothelial age', which could be either more or less than their chronological age. In fact there were wide variations between individuals, with some older people having a strikingly 'young' endothelium and vice versa, probably due to diet and lifestyle. The process of measurement was non-invasive and occasioned no discomfort.

The endothelium can also be stimulated by a rise or fall in skin temperature. It would therefore be possible to design an easy-to-use device, like a large wristwatch, to measure endothelial health as the skin is first warmed and then cooled over a ten minute period. The researchers envisaged that this 'endotheliometer', once developed, would be able to be used by a variety of health professionals, and potentially by the general public, as an indicator of general health.

20. Clothing for active ageing

This project developed a range of clothing designed for active older people. Older people worked with academics from a range of disciplines and people from the clothing and technology industries to design a layered clothing system with built in monitoring devices.

Findings 20: Design for Ageing Well: improving the quality of life for the ageing population using a technology enabled garment system.

Jane McCann, Dr Katy Stevens, David Taylor, Jeni Bougourd, Juliette Smith, Jeanette East and Molly Price, University of Wales; Chris Nugent, Professor Bryan Scotney, Dr Paul McCullagh, Dr Dewar Findlay, Professor Sally MacClean, Dr Eric Wallace, Liam Burns and Ian Cleland, University of Ulster; Professor Stephen Benton and Boris Altemeyer, University of Westminster; Dr Tracey Williamson, Dr Julia Ryan and Laura Seppala, University of Salford; and Dr Victoria Haffenden, University of Brighton. Plus a range of industrial collaborators including clothing producers and providers of technology and fabrics.

The aim of this research was to develop 'smart' clothing suitable for active older people, especially walkers. The researchers, representing several disciplines, worked with the clothing and technology industries and with older people to develop a layering system suited to their needs. Body scanning captured the size and shape of older male and female participants. Older people informed the design, materials and colour selection and styling. They determined how new technologies were included and assessed how easy the garment was to use. Prototypes were produced which combined smart fabrics with devices for monitoring vital signs, location and warmth.

Working with the reference group of people aged from 60 to 75 enabled researchers from a variety of disciplines and stakeholders from the clothing industry to understand what was needed in terms of design. Clothing had to cater for variety and for physical limitations. A layering system was devised consisting of next-to-body garments to monitor vital signs, insulation layers with heated panels, and protective outer layers with built in communication devices. Involving the clothing industry helped older people to better understand what was possible with modern materials and construction techniques.

The layering system enhanced comfort and was specifically designed around the ageing body and its needs (size and shape, movement, dexterity, moisture management, thermal regulation and protection). Older people attended trade events and had other opportunities to interact with the clothing industry, raising its awareness of the potential market amongst older people. They also tested the various devices designed to enable them to monitor their own wellbeing, the distance walked, their location and so on.

The research established a need for a positive approach to designing for older people, based on their preferences, not those of the fashion-conscious young. Older people wanted fewer styles, but in a wider size range and with a greater choice of colours, fabrics and textures. They preferred subtle flattering styles sympathetic to the older figure and cheerful or subtle colours suited to older skin tones. Having had a negative experience of early synthetic materials, older people did not initially understand the value of today's innovative fibres. They were keen to experiment with new technology, in spite of some current shortcomings in design.

The researchers felt that the project demonstrated the value of working across disciplines, and of bringing academia and industry together to pool knowledge and skills, which was new to clothing design. Designing for older people with older people allowed them to express their requirements directly to the industry and academia and resulted in clothing that was functional and aesthetically and culturally fit for purpose. This approach prompted a slower but more considered and responsible design process than generally happens with 'fast fashion'. The research demonstrated that older people represent a new and growing market that is currently neglected.

21. Searching for indicators of ageing and the impact of environmental variation.

One part of this statistical study examined the interaction between the ageing of organisms and changing environmental conditions in determining population growth rates. Another examined the variability in rates of ageing of individual organisms in a constant environment.

Findings 21: Trajectories of senescence through Markov models

David Steinsaltz, University of Oxford; Professor Jim Carey, University of California at Davis; Dr Martin Kolb, University of Oxford; Dr Habib Saadi, Dr Viani Djeundje Biatat, Dr Andrey Pavlov, Gurjinder Mohan.

The research aimed to calculate the sensitivity of population growth to environmental changes. A new formula was developed which had practical implications for studying the ecological response to climate change and other significant changes. It also had theoretical implications for patterns of ageing.

Ageing is a process that occurs on many scales, for example on time scales from seconds to centuries and on size from cells to whole populations. This research developed statistical and mathematical models on both the level of organisms and the level of populations.

Based on existing research at the University of California at Davis, the aim was to discover behavioural patterns that anticipate ageing and begin to explain how and why rates of ageing vary between individuals. Physical ageing is an inexorable process but it does not proceed at the same pace in all individuals. The question was, is there anything that can be observed that explains this variation?

The researchers undertook an experiment that observed the lives of fruit flies. This produced a mass of data which could, it was thought, be used to create a theoretical model of the basic processes of ageing. The new mathematical models developed might also help to explain the interaction of ageing, population growth and environmental fluctuations amongst plants and animals.

The research found that, because the behaviour of the fruit flies was so variable, it was not possible to identify a single indicator of ageing other than calendar age. However frequency of eating could potentially be a basis for estimating the ageing process, while the timing of the peak of activity seemed to be informative about the timing of mortality, though the small sample size means that these findings remain tentative.

The researchers were able to develop statistical tools that will be useful in future, including measuring key moments of activity in the fly's day rather than every moment, and measuring backwards from the end of life rather than forwards towards it.

The project was successful in developing a greater understanding of how to integrate theoretical models with experimental observations. It also collaborated on a new way of calculating the interaction between the ageing of organisms and environmental variation and the consequent effect on the health of wild populations.

22. Healthy working in later life

By 2020, over a third of the UK workforce will be over 50. This research used participative methods to develop ideas to improve the health, productivity and quality of life for older workers. Findings were shared widely throughout.

Findings 22: Working late: strategies to enhance productive and healthy environments for the older workforce.

Cheryl Haslam, Loughborough University; Stacy Clemes, Loughborough University; Joanne Crawford, Institute for Occupational Medicine; Alistair Gibb, Diane Gyi, Roger Haslam, Martin Maguire, Hilary McDermott, Kevin Morgan and Colette Nicolle, Loughborough University.

People are continuing to work until later in life. Changes such as legislation against age discrimination in employment, and the equalisation of the state pension age between women and men, are having an impact. Later life working presents new challenges to government, employers, occupational health services and workers and their families.

The research found that many employers adopted an age positive approach and saw older employees as essential to maintain knowledge, skills and experience within their organisations. A minority, however, still used age as a criterion for selection. Older job seekers felt that age was often taken into account in the selection process and sometimes concealed key dates, though they rarely complained.

Flexible working practices such as flexitime, part time working, job sharing and working from home could help people work for longer. Older workers felt, however, that these policies should apply to everyone, since they would benefit people irrespective of age, especially those with health problems or caring responsibilities. Flexible working would result in healthier working lives overall.

A second strand of the research asked whether the journey to work was a factor in deciding whether or not to carry on working. Travel issues were identified and analysed, as were a number of ideas for adapting the journey to work. Most employers had no specific schemes to help with commuting. An 'Improving the Journey to Work' pack was developed to help workers and employers explore the options.

A third strand was a substantial inquiry into occupational health. Surveys showed that most workers had little contact with occupational health initiatives. Fewer than a quarter were as active physically as they should have been and most spent large amounts of time at work sitting down.

The research team developed a new intervention called 'Walking Works Wonders' to encourage people to be more physically active at work. The intervention was evaluated with over 1000 workers at 10 worksites across England and Scotland. The team ran a competition with the Royal Society of Arts for designers to develop innovative ways of encouraging people to be more active at work. The winning entry was 'Walking Lunch', a large interactive map placed in a communal area which displayed the surrounding areas of the workplace and encouraged employees to use their lunchtime breaks for a local walk. Stimulating physical activity in this way benefited workers of all ages, increased productivity and quality of life at work and reduced sickness absence, resulting in a very positive return on investment.

The final strand of research encouraged managers and workers to think about how to improve the design of tasks, tools and environments at work. Workers of all ages and from many different industries reported musculoskeletal problems; those over 50 were particularly concerned to remain fit and healthy for work. They came up with over 200 design suggestions relating to healthy working and reducing physical and mental stress on the body, over half of which involved little or no cost. The 'Organiser for Working Late' (OWL) was developed to improve communication about design in the workplace and support later life working. Tools and resources developed by the project can be found at: www.workinglate.org/

23. The changing picture of the 'Third Age'

The 'third age' is a phrase now used to describe people in their 50s and 60s who enjoy both improved health and improved incomes due to occupational and private pensions. These two factors, along with other economic and personal considerations, influence the choices people make about work and retirement and raise wider policy questions.

Findings 23: Transitions, choices and health in early old age: analyses of longitudinal data.

David Blane, Imperial College; Bola Akinwale, Imperial College and DWP; Melanie Bartley, UCL; Paul Boyle, University of St Andrews; Giuseppe Costa, University of Turin; Seeromanie Harding, University of Glasgow; Teresa Lefort, Older People's Reference Group; Kevin Lynch, ONS; Caroline Needham, Help the Aged; Pekka Martikainen, University of Helsinki; Richard Wiggins, Institute of Education.

The period immediately before State Pension Age is a time of important changes and choices in people's lives. The researchers set out to determine how participation in the labour force had changed over recent decades for those in their 50s and 60s and how their health status had changed. They explored the impact of combining work with caring responsibilities on their health. They also wanted to determine whether the nature of the welfare state in different countries (in this case, Britain, Finland and Italy) influenced these three factors of health, employment and informal care.

They found that, in the five years before state pension age, only 48% of men were still working in 2001, compared to 78% in 1971. Those unemployed and looking for work fell from 5% to 3% over the same period. The proportion of men of that age who had retired was 25% in 2001 compared to only 7% in 1971, while 20% were permanently sick in 2001 compared to only 9% in 1971.

For women, by contrast, there was a small increase in the number in work in the five years before their state pension age (from 49% to 55%), while the number unemployed remained the same. The number of women of that age who defined themselves as home makers or informal carers fell by nearly half, from 41% to 21%, while the number who called themselves retired or sick rose.

Remarkably, between 1971 and 2001, mortality rates amongst men aged 60 – 64 fell by 73% for those who were retired and by 57% amongst those who were unemployed. For women between the ages of 55 and 59, the fall in the mortality rate was 70% for those who were retired but there was an apparent increase of 26% for those who were unemployed. Permanently sick men were three times more likely to die within five years than those in work in both 1971 and 2001.

Across the age group of 50 – 64 as a whole, 24% of women and 18% of men were both working and providing care to someone else. Those providing care were themselves more likely to have a long term illness and be in somewhat poorer health.

The researchers raised a number of far reaching and important questions. For example, would it be necessary to raise the State Pension Age if all men worked until 65? Should early retirement be discouraged? Will keeping women in the workforce for longer reduce rates of volunteering and informal care? What new social roles are available to those in this new phase of their lives? And why do informal carers appear to have poorer health but a lower risk of dying?

The findings on differing welfare states raised doubts about the conventional wisdom that a more generous welfare system necessarily leads to longer lives.

24. The effect of depression on the immune system in older hip fracture patients

The efficacy of the immune system is affected by age and by stress, whether physical or psychological. This study found that the development of depression in older hip fracture patients resulted in the suppression of the immune system, and that speed of recovery could be enhanced by treating the symptoms of depression.

Findings 24: Synergistic effects of physical and psychological stress upon immunosenescence.

Janet Lord, University of Birmingham; Anna Phillips, University of Birmingham.

Over 80,000 falls a year result in hip fracture in the UK. Although hip fractures are treatable, they often have a poor outcome amongst older people, with physical injury leading to loss of independence and impaired quality of life. The reasons for these poor outcomes are not well understood and this research set out to clarify these.

It found that many patients with hip fracture also have depression. Depression can affect recovery rates and make people susceptible to other risks, such as poor rehabilitation, increased risk of falling again and greater susceptibility to infectious disease. The effects of stress and age appear to interact, with negative consequences.

The stress hormone cortisol suppresses the activity of the immune system, whereas another hormone (DHEAS) has anti depressive effects and enhances the immune system. The balance between these two hormones changes as we age, with the result that the immune function in older adults subject to stress can become suppressed. This study tested the idea that depression (psychological distress) could make the impact of the physical stress of hip fracture worse in older adults.

The study centred on 101 patients over 60 admitted to Birmingham hospitals. It found that a third of older hip fracture patients developed depression within six weeks of fracturing their hip. Those who developed depression had significantly poorer physical function at six weeks and six months after surgery than those who were not depressed. They spent more time in hospital or rehabilitation, and the onset of depression was also associated with poorer walking speeds, poorer balance and greater difficulty in carrying out everyday tasks.

The function of the immune cells that fight bacterial and viral infections was reduced after hip fracture but only in patients with depression. There was an increase in the stress hormone cortisol (which suppresses the immune system) and a decrease in DHEAS (which enhances it) in depressed hip fracture patients, so the ratio between the two hormones changed. Patients with a higher depression score had a higher cortisol:DHEAS ratio. They also had a slower walking speed, suggesting that the hormonal imbalance might contribute to reduced physical functioning in these patients.

In a further small pilot study, the researchers sought to compare UK white and Punjabi hip fracture patients to see whether ethnicity and an individual's beliefs about their illness might be a factor in their recovery. However they were unable to do so because too few Punjabi patients met the criteria for inclusion. However, information about patients in the Punjab suggested that they were younger than those in the UK, and included more men. They had similar levels of depression, but were more affected and distressed by their hip fracture and felt their treatment had helped them less.

25. Family care in a changing world

Older people of Bangladeshi and Pakistani origin resident in Britain rely on close family members to provide care and support. However, family life is changing due to migration which is forcing rapid change on patterns of family support.

Findings 25: Families and Caring in South Asian Communities

Christina Victor, Wendy Martin, Maria Zubair; Brunel University

This study set out to document the changing nature of family lives and expectations amongst people over 50 in Bangladeshi and Pakistani communities in a southern English town.

Figures from the 2011 census indicate that population of the UK has greater ethnic diversity than previously, with 16% of the population of England and Wales being non-white. Both Bangladeshi and Pakistani communities are characterised by high levels of deprivation and ill health compared to other minority groups and the population as a whole. People in these communities are now approaching old age.

The researchers recruited 110 participants, divided almost equally between the two communities and between men and women, and aged from their 50s to their 70s. They had moved to the UK either for work (for men) or for marriage (for women) and had lived in the UK for 25 years on average; few had intended to stay into old age when they first arrived.

Some participants had two 'ages', an official passport age and their true age which could vary in either direction. 'Old age' was defined not by a specific number of years lived but by significant events which marked a change in family roles and responsibilities, such as the marriage of children or birth of grandchildren. Older women in particular expressed their status as an older person through dress and behaviour, thereby attracting greater respect. Many men and women believed that their life expectancy was determined by the will of God and saw later life as an opportunity for greater religious observance but also social involvement, with a focus on quality rather than quantity of life.

The usual expectation of these communities was that they would have both close locally-based family ties and links back to a network of family relationships in the country of origin. However the pattern proved to be more complex and dynamic. For this community, the migration decisions of parents, siblings and children meant that they had a wide web of relationships both within the UK and across the world, including North America, Australasia and Europe, while ties back to the country of origin could weaken with the death of a parent.

Strong links with local community organisations were the norm and these links were vital in helping people to cope with the challenges of getting old in a foreign land. The local community was the focus of social activities and provided support at times of celebration, such as weddings, or stress, such as bereavement. It was not, however, a substitute for care and support in old age from close family members. The children or the spouse were seen as the primary source of advice, support and care for older people.

However, there was a recognition that these expectations might change over time. The idea of receiving social care from the statutory services was seen very negatively. It could be interpreted as demonstrating a lack of family loyalty, though there were positive comments from those who had actually received such care. The researchers suggest that the statutory services should concentrate on helping families to provide care, rather than substituting for such care.

26. The stimulus of contemporary art

How do older people benefit from visiting exhibitions of contemporary art? This study assessed how older people responded, whether or not they were familiar with modern art. It found that there were valuable personal and social gains to be made, but that barriers could sometimes detract from the experience.

Findings 26: Contemporary visual art and identity construction – wellbeing amongst older people.

Andrew Newman, Newcastle University; Anna Goulding, Newcastle University. Partners and collaborators included Arts Council England; Equal Arts (a charity facilitating access to the arts for older people); Age Concern Gateshead; BALTIC Centre for Contemporary Art; Northern Gallery for Contemporary Art; and the Institute for Ageing and Health, Newcastle University.

This research project explored the responses of two groups of older people to contemporary art. In one group, members were already involved with the arts or with campaigning on ageing issues, while the other group was made up of those who are traditionally less involved with the arts (for example men, those who are disabled, from poorer or minority ethnic backgrounds or living alone). The project had difficulty recruiting ethnic minority elders, so their participation was limited.

The aim was to assess the reactions of both groups to contemporary visual art and its impact on their confidence and wellbeing.

Some newcomers to contemporary art showed increased knowledge and understanding after only three visits. Initially they used the art works to reminisce but by the third visit they were discussing the artist's intentions, symbolism and the way the works were presented. Those who were already involved in cultural activities saw the visits as an opportunity for learning and for mental stimulation. Visiting art galleries was one of a range of activities they undertook to keep themselves mentally and physically active.

Both groups particularly enjoyed discussing what they had seen after the visit, whether or not they had liked the art work. Works seen as controversial, such as an exhibition featuring prayer mats, stimulated debate on wider issues.

Participants used the art to discuss significant events in their lives. Reminiscing as part of a group created opportunities to discuss shared experience, which led to a sense of personal affirmation. Relationships developed between the older people themselves and between them and group leaders, researchers and curators.

There were some barriers to participation, however. Art galleries were seen as being run by an elite, which prevented some people from participating. The use of complex language made people feel inadequate, though being given a tour by someone knowledgeable overcame this problem. Other barriers included poor disabled access to venues, possible cost and lack of transport. Small print and poor lighting also presented problems.

The study highlighted the social role of galleries, museums and heritage organisations. Visits to art galleries were personally and collectively rewarding to the older people and helped to boost their self-esteem. However, the participants interpreted art in ways which were meaningful to them, which may have had little in common with what curators were trying to communicate. The researchers conclude that contemporary art needs to be presented at a number of levels, with varying degrees of interpretation, to be accessible to a wide range of people.

Two follow-on projects emerged. One developed training on working with older people for artists and care professionals in the North East and this material was included in the MA programme at Newcastle University. The second contributed to research at Bangor University on how the arts can help to create dementia friendly communities.

27. Sustaining IT use among older people

This study explored how older people's use of IT could be sustained and enhanced. Older people are frequent users of computers and enjoy the many and varied benefits that this brings. But there can also be barriers to IT use, including physical limitations, lack of support and limited opportunities to enhance skills.

Findings 27: Sustaining IT use by older people to promote autonomy and independence (Sus-IT)

Leela Damodaran, Wendy Olphert, Matthew Atkinson, Stephan Bandelow, Matt Bell, Terri Gilbertson, Penny Harrison, Melanie Heeley, Eef Hogervorst, Cilin Machin, Nga Nguyen, Jatinder Sandhu, Marian Smith, Veronica van der Wardt, Loughborough University; Amr Ahmed, University of Lincoln; Peter Gregor, Paula Forbes, David Sloan, University of Dundee; David Frohlich, Chris Lim, University of Surrey; Irene Hardill, Northumbria University; Suzette Keith, Middlesex University; Leonie Ramondt, Anglia Ruskin University; Mark Shelbourn, Nottingham Trent University; Hannah Beardon, Steve Thompson.

The research found that many older people were frequent users of computers and the internet and greatly valued the benefits this brought. Being 'digitally engaged' helped to sustain independence and enhance health. It helped people to develop new interests and skills, interact with others, take advantage of commercial opportunities and participate in civic life.

However, problems concerning vision, dexterity, memory or other factors could put people off and older people were often unaware of features that could help them overcome such difficulties. Many felt that they lacked the skills and competence to tackle technological challenges. Support from others was key to overcoming such difficulties, but such support was rarely available in the home or community (unlike in the workplace). Where training existed, it was usually about helping people to get on line, rather than helping them to stay there.

The aim of this research was to understand what problems and difficulties older computer users face, what potential solutions could be developed, and what more could be done to help older people stay digitally engaged. A wide range of stakeholders, including older people and researchers from a number of disciplines, took part in the research. Older people were keen to help to design systems and services that meet their needs.

Initially, 750 people over 50 from across the UK took part in a survey, complemented by case studies. This found that many older people were frequent users of a variety of digital technologies (computers, mobile phones, tablets and eBook readers) and used their device daily or several times a week. The difficulties they identified included a lack of technical skills to do specific tasks or solve problems; the use of jargon; physical impediments; and concerns about computer security. The research encouraged ICT developers to design for older people and produced a catalogue of 40 new ideas and a toolkit on involving older people. Older people mostly did not know about existing aids to accessibility in their computers, so a means was developed for semi-automatic adjustments to be made.

Support from other people was the most important factor in helping people use technology successfully. Most current courses concentrated on initial learning, while what was needed was ongoing learning and support. Key proposals were to use venues in the community (schools, libraries, village halls); to embed new learning in existing activities and interests; and to establish a local source of trusted advice.

The research concluded that the two key determinants for staying on line were the design of the technology itself and the availability of continuing learning and support. The researchers propose a joined up policy for the digital inclusion of older people encompassing Government, business and the third sector.

28. Exploring concepts of ageing in contemporary culture

This study considered how far the experience of ageing may be interpreted through, and be shaped by, competing narratives of ageing in contemporary culture, including those in contemporary fiction. Concepts of ageing are subject to complex cultural influences which can be explored in a variety of ways, including through writing and through reading. The researchers find that prevailing images of old age no longer reflect the diversity or the expectations of today's older people.

Findings 28: Fiction and the Cultural Mediation of Ageing: The Importance of Controlling the Narrative of Ageing

Professor Philip Tew, Dr Nick Hubble, Dr Jago Morrison: Brunel University, with Demos, the Mass Observation Archive at Sussex University and the London District U3A.

This project aimed to research how older people relate to representations of ageing both in everyday social interaction and in fiction. It examined how those representations influenced older people's own understanding of ageing and how they wrote reflectively about it.

The research had three strands. Firstly the researchers commissioned a 'directive' from the Mass Observation project at the University of Sussex, inviting contributors to reflect in writing on changing representations of older people and how these had influenced their own understanding of ageing. One hundred and ninety three narrative responses were received.

Secondly, eight reading groups were established in collaboration with London-based U3A groups; each of these read and discussed nine novels published since 1945 embodying very different depictions of ageing, again while maintaining self-reflective diaries. The third strand consisted of a series of semi-structured interviews around ageing with contemporary authors, who also discussed their work with large invited audiences; these events were recorded and transcribed.

In addition, the researchers worked collaboratively with Demos, the public policy think tank, to produce a report called *Coming of Age*. Key findings of this handbook included the need for a strategy to underpin health, social inclusion and financial resilience throughout life. It noted that older people were a very diverse group and choice and flexibility were essential. Age discrimination should be challenged and better ways found to target state support to those that need it. Older people felt alienated by the prevailing rhetoric that sees them as a burden: society should recognise the valuable social roles that they play and the skills they have to offer to the wider community. Many assumptions about older people, for instance that they disproportionately fear crime or are prone to loneliness, were seen as stereotypes that did not reflect most people's personal experience. Older people insisted on being recognised as individuals and should be treated as such. The Demos report made a series of recommendations for areas of public policy, including later life working, pensions, active ageing and end of life care.

This research project on contemporary culture found that older people work to retain control of their own personal narrative and view of themselves. There was felt to be a shortage of positive older characters in contemporary fiction and too many stereotypes of dependency in popular culture. Most people resisted defining themselves as old – as either third age or fourth age – but rather retained their sense of their own identity and saw themselves as 'ageless'. They no longer expected to wind down on retirement and die within a few years. Being categorised by age resulted in stereotyping and failed to recognise the individuality and diversity of older people. The researchers recommend that policy makers and others pay careful attention to what older people actually say when they are given the opportunity speak freely.

29. Developing systems for delivering better nutrition in hospitals

This study set out to design a better way of providing sufficiently nutritious food and managing the food intake of older people in hospital.

Findings 29: Mappmal: a multidisciplinary approach to developing a prototype for food provision and nutritional management of older hospital patients.

Paula Moynihan, Newcastle University, Alastair Macdonald, Glasgow School of Art (GSA); Lisa Methven and Margot Gosney, University of Reading (UoR); Patrick Oliver, Newcastle University (NU); Carl May, University of Southampton; Clare Bamford (NU); Gemma Teal (GSA); Alan Bell, Carol Fairfield (UoR); Ben Heaven (NU); RoussaTsikritzi, Clare Payne, Yiannis Mavrommattis (UoR); Robert Coomber, Jack Weedon (NU) and Martin Maguire (University of Loughborough).

Forty percent of people over 65 risk developing or exacerbating malnutrition while in hospital, resulting in a deterioration of their health and a delay to recovery. This project brought together researchers from a range of different disciplines to devise and test new approaches. They included specialists in nutrition and dietetics, design, sociology, computer science, speech and language therapy, medicine and ergonomics. Older people, nurses, doctors, catering staff and other stakeholders were also involved. The researchers found the involvement of multiple approaches and skills very productive. While it made the process more complex, the outcome was more innovative, workable and more acceptable to the end user.

The first step was to examine existing practice. Problems included inflexible food ordering, poor mealtime ambiance, inflexible service, difficulty swallowing, inaccurate monitoring of food intake and lack of help at mealtimes. No-one had overall responsibility for ensuring adequate food intake. Although patients liked the food, nearly 40% was wasted, mainly because portion sizes were too large. Accurate information on patients' intake was missing, so shortfalls could go unnoticed.

Various solutions were researched. Highly nutritious 'mini meals', in the form of biscuits, ice cream, sauces, cakes and soups, were developed so that patients could be offered nutritious snacks to supplement their diet alongside smaller portions at normal meal times. Minimeals were designed to be available on the ward outside normal mealtimes and a design for a special food trolley was developed. Guidance was produced on drinks for people with swallowing difficulties, which were found to be very variable. The researchers felt that further work was needed to determine the optimum characteristics and portion size of pureed meals.

A 'hospital foodie' prototype software programme for managing patients' food and nutrition was developed. Each patient could access information on their individual nutrition needs and food intake using a bedside touch screen, programmed for them individually. Through the touch screen they could also enter their preferences. Staff could monitor the nutritional intake of each patient at the bedside and remotely. Before each meal, the hospital foodie system prompted staff to provide the necessary help to the patient and reminded the patient what they had ordered. Staff could use the touch screen to record what the patient had actually eaten, rather than what they have ordered, and the nutrients are automatically calculated and tracked against targets. Staff were alerted when daily nutritional requirements were not met. The system allowed information to be shared over time between all those responsible to the care of the patient and also on repeat visits to hospital. Further funding and commercial partnerships were sought to develop the hospital foodie system further with a view to implementation in hospital and care settings.

30. How older people participate in rural communities

The older population in rural areas is growing rapidly. This study sought to find out how and to what extent older people are connected to and participate in the life of rural communities.

Findings 30: Grey and Pleasant Land? An interdisciplinary exploration of the connectivity of older people in rural civic society.

Catherine Hennessy, Ray Jones, Andrew Phippen, Innocento Maramba, George Giarchi, Gloria Lankshear, Plymouth University; Robin Means, Graham Parkhurst, Charles Musselwhite, Ian Shergold, Ian Biggs, Simon Evans, Jane Bailey, Dan Buzzo, University of the West of England; Kip Jones, Kathleen Galvin, Les Todres, Yvette Staelens, Lee-Ann Fenge, Rosie Read, Marilyn Cash, Bournemouth University; Vanessa Burholt, Judith Phillips, Swansea University; Janet Smithson, Exeter University; Nigel Curry, Rhiannon Fisher, University of Gloucestershire.

The study examined how older people were involved in community life in six study sites in Wales and the Southwest of England, focusing on issues such as their participation in leisure activities, and access to services like transport and broadband. It explored the experience of growing old in the countryside, including that of minorities such as Gypsies and Travellers and gay and lesbian older people.

A survey of 920 older people was carried out across all six sites. Oral histories were also conducted along with interviews, focus groups, arts projects, on line discussions and a professionally made film.

Nearly a third of those surveyed did some form of voluntary work and nearly half had done something to help others over the previous year. Participation was greater among married people, those with higher educational qualifications and those who had had higher status jobs; it declined with age and health. Older people valued the safety and security of their community and the beauty of their rural surroundings very highly.

Leisure activities added interest and meaning to people's lives and enhanced their connections with the wider community. Later life was a time for continuing or renewing leisure pursuits, though there was an overall decline with age, and activities were increasingly centred on the home. Barriers to participation included lack of opportunity, lack of access to transport and, in the case of Gypsies/Travellers, lifelong experience of discrimination.

Transport or the lack of it affected older people's involvement. While transport was not a major issue for most, for a small proportion it could severely limit or prevent involvement. Two thirds of those without access to a car experienced such difficulties, while those with a car often had to limit its use. Most trips were short, less than five miles. Older people found it particularly difficult to reach hospitals, cinemas, the police and museums. Getting around within the community led to interactions with others which were highly valued.

Older lesbians and gay men were a largely unseen minority in rural settings. Both groups were very aware of prejudice, especially in small rural communities, and were extremely cautious about being open about their sexuality. As a result, for some, participation in mainstream community life was limited. Negotiation with service providers was difficult or non-existent, and stories of suicide for fear of being 'outed' were reported.

One project used the arts to explore the physical and social landscape in which older adults live. It found that older adults played key roles in rural community life, organising and running activities and events. Those who had spent their working lives in the same area had an enriched sense of place. Some tension existed between those born in the area and 'incomers' but both

groups were involved in local activities, and some communities combined local knowledge with the skills of more recent arrivals to mutual benefit.

Another project studied deprivation among older people. It found that one fifth of older rural households relied on the state pension as their sole source of income. They experienced significant hardship, though were sometimes reluctant to admit to difficulties. They 'made do' by managing their finances carefully and by going without. The social and environmental attributes of the area were often seen as compensation. Half the older people in these rural areas had no broadband access. The particular mix of people, housing, shops and services in each area affected life on a low income: the presence of a bus route or volunteer welfare service could make the difference between social isolation and inclusion for older people on low incomes.

31. Negotiating stairs safely

Falling is a major problem as people get older and most serious falls happen on stairs, either in the home or in public places. Two thirds of falls that subsequently prove fatal happen while people are going downstairs. This project set out to find ways of helping older people negotiate stairs more easily, reducing the risk of falling. It studied how people move on a staircase, examined the design of stairs and looked at the benefits of exercise.

Findings 31: Biomechanical and sensory constraints of step and stair negotiation in old age.

Costis Maganaris, Liverpool John Moores University; Vasilios Baltzopoulos, Brunel University. With I. Di Giulio, University College London; D.A. Jones, E. Kingdon, and N. Reeves, Manchester Metropolitan University; G. Spiropoulos, University of Thessaly; J. Gavin, A. Ewen, G.S. King and T. Underdown, Liverpool John Moores University; and M Royes, Building Research Establishment.

The research found that going downstairs demanded more of older people than of younger ones: they used a greater proportion of their strength and adopted different strategies to control their movements and avoid catching their heels. Staircases with high risers and short treads were particularly difficult for older people. Exercise could help, however.

Older adults relied more than younger ones on their knee and ankle joints when going downstairs. Going down one step at a time, by putting both feet on the same step each time, was slower but meant that the ankle and knee joints didn't have to take the whole weight of the body. It reduced stress on the lower leg. Walking sideways was faster, while walking forwards resulted in a slower but more constant descent.

On steep stairs, the knee and ankle joint of older people were less loaded compared to those of younger people, and their heel passed further forward. With shorter treads, older people stood on one leg for longer and their centre of mass moved more slowly. When the treads were short, older adults almost always changed their strategy as they descended, unlike younger people. Different approaches to descending stairs altered the demands on the muscles, joints and limbs.

The researchers compared the design of stairs with risers of different heights and treads of different widths. Older people had greater difficulty negotiating steps with high risers (305 mm as opposed to the standard 174 mm) and steps with narrower treads (175 mm as against the normal 275). Different strategies needed to be adopted for these circumstances, including the use of a handrail or rotating the feet or body.

Exercise training helped in some respects. Resistance and stretching exercises improved knee and ankle muscle strength and ankle flexibility, but made little difference to joint movement when descending stairs. The exercise improved ankle and hip muscle forces but not knee muscle forces. If stairs were steeper, however, the opposite occurred and greater knee muscle forces were produced. Increasing leg strength appeared to enable older adults to redistribute movement across their joints. Exercise also meant that people leaned forward and swayed from side to side more as they were descending, though this did not happen if the stairs were steep.

The research suggests that older people operate closer to their strength limits than younger people however steep the stairs. Older people find it particularly difficult to negotiate both steep stairs and narrow stairs. Improved stair design, including effective handrails, was needed, together with appropriate exercise.

32. The ageing of cells

The ability to slow down the onset of cell ageing has important implications for the prevention of many age-related diseases. Understanding how cells age should help in the design of drugs which overcome the adverse effects of cell ageing. A new drug called rapamycin significantly affected the speed at which cells age.

Findings 32: Towards Understanding the biological drivers of cell ageing.

Dr Lynne Cox and Dr Penelope Mason, University of Oxford.

It has become increasingly apparent that cellular ageing contributes to ageing of the whole body through a process known as cell senescence. Ageing cells lose their ability to divide and repair themselves, which results in poor wound healing and problems in maintaining important organs. Senescent cells also create a state of chronic inflammation and break down tissues on which the body depends, potentially leading to many of the diseases of old age.

The premature ageing disease known as Werner Syndrome arises from the loss of a single protein called WRN, which protects against ageing. In this study, the researchers removed WRN from cells, so that they aged prematurely and could be studied. They also examined cells which aged naturally, to see how that happened.

The research had three objectives: to develop a new way of studying the ageing of cells in the laboratory; to analyse biochemical changes in ageing cells; and to test whether the ageing process of cells can be modified using drugs.

Obtaining naturally ageing cells suitable for biochemical analysis is difficult, as such cells by definition do not proliferate. However premature ageing sometimes occurs naturally, as in Werner Syndrome, when the protein WRN is missing. The researchers developed a 'chemical switch' which controlled WRN levels so they could remove it from human cells in a tightly regulated way.

Secondly, the researchers studied cells that were ageing naturally, taking measurements as cells aged, and investigated the changes in their proteins at different stages in the ageing process. They concluded that increased stress and decreased ability to remove damaged components may drive cell ageing.

Finally, a newly discovered drug, rapamycin, had been shown to increase the lifespan of mice by a small but significant amount. The researchers determined that cells treated with rapamycin were able to go through more rounds of cell division than untreated cells before showing signs of ageing, so rapamycin did indeed appear to be effective in delaying the onset of cell ageing. The objective then was to test this effect on different types of cells and eventually on whole organisms.

The researchers suggest that their findings have wider implications for an ageing society. Cell ageing is likely to be an underlying cause of many otherwise dissimilar diseases of old age, so reducing or removing ageing cells could greatly improve people's health. Equally, a better understanding of the biochemical pathways could lead to novel forms of treatment. The researchers conclude that age related disease could and should be treated, not accepted as a necessary consequence of increasing years.

33. What determines how well we age?

This large and multifaceted research project set out to study healthy ageing, in order to understand how people can stay healthier for longer. The proposition was that, if it were possible to identify factors which promote healthy ageing and factors which lead to difficulties in later life, it should also be possible to modify them, increasing the chances of longer, healthier lives.

Findings 33: HALCyon: Healthy Ageing across the life course; Capitalising on the value of UK Life Course cohorts

Diana Kuh; Avan Aihie Sayer; Yoav Ben-Shlomo; Rachel Cooper; Ian Day; Ian Deary; Jane Elliott; Catharine Gale; James Goodwin; Rebecca Hardy; Alison Lennox; Marcus Richards; Thomas von Zglinicki; Tamuno Alfred; Paula Aucott; Sean Clouston; Mike Gardner; Zeinab Mulla; Emily Murray; Sam Parsons; Vicky Tsipouri.

With Cyrus Cooper; Leone Craig; Dorly Deeg; Panos Demakakos; John Gallacher; Scott Hofer; Richard Martin; Carmen Martin-Ruiz; Geraldine McNeill; Gita Mishra; Chris Power; Paul Shiels; Humphrey Southall; John Starr; Andrew Steptoe; Kate Tilling; Lawrence Whalley.

This highly collaborative study explored the evidence for what helps older people to remain healthy and independent for longer. It took account of three aspects of healthy ageing: physical and mental capability (the capacity to undertake the physical and mental tasks of daily living), psychological and social wellbeing, and underlying processes of biological ageing. It made use of nine existing UK studies (known as cohort studies) which follow up groups of people over time, gathering repeat measures of their health and life experience. These studies brought together information on 30,000 people born between 1918 and 1958. Eight different work streams examined how various factors impacted on later life.

One work stream used measures of physical capability, such as grip strength and balance, and cognitive capability, such as verbal memory, and investigated factors earlier in life which were related to level of capability at older ages. Adults with better physical capability were less likely to develop health problems and survived longer than those with poorer physical capability. Physical capability declined with age across the cohort studies. Better socio-economic circumstances in childhood, higher birth weight and maintaining a good body weight in adult life were related to better physical capability in later life. Better childhood socio-economic circumstances, higher childhood cognitive ability and levels of education were all associated with higher levels of adult cognitive capability.

There was much less evidence of decline in well-being with increasing age. Maintaining a sense of wellbeing and continuing to be involved with others were important aspects of healthy ageing. A second work stream found that disability and chronic health problems in adulthood were linked to depression and anxiety in older age, while living in a cohesive neighbourhood led to greater mental wellbeing, independently of other factors.

The third stream examined subjective experiences and beliefs through biographical interviews. The way older people viewed ageing differed according to their level of capability. Both their own health and that of their partner made a difference to the opportunities older people were able to take up and to their attitudes to ageing. The subjective biographical data confirmed a strong association between wellbeing and neighbourhood cohesion.

A fourth stream reviewed the relationship between diet and capability. It found that there was little evidence relating diet to physical and cognitive capability; the information was difficult to compare because it was collected in different ways. It was also difficult to separate the effects of diet from other factors that influenced healthy or unhealthy ageing.

A fifth work stream showed that the areas people had lived in during different stages of their lives impacts on their health. Existing studies showed that those living in deprived areas had poorer health regardless of their personal socioeconomic status. This study concluded that the characteristics of the area in which people grew up, or where they had lived in mid-life, had a long term effect on their capability.

The last three work streams investigated the underlying biology of healthy ageing. The sixth work stream sought to determine whether telomere length could be used as a measure of biological ageing. Telomeres are a region at the end of a chromosome that protect it from destruction. There was only a weak relationship between telomere length and capability, and the researchers concluded that it would be premature to use telomere length for diagnosis or risk assessment. The seventh work stream found no consistent evidence of an association between physical or cognitive capability and a range of common genetic markers for chronic diseases that increase in frequency with age. However, the eighth work stream added to the growing evidence that ageing is associated with a decreased ability of the body to respond to daily challenges, as reflected in the changing patterns of the stress hormone cortisol over the course of a day.

34. Keeping track of food and drink consumption

The NANA project used touch-screen computer technology to record the consumption of food and drink, while also monitoring physical and mental activity and mood in older people. The technology was used in people's own homes and proved to be both reliable and easy to use.

Findings 34: Novel Assessment of Nutrition and Ageing: NANA project

Arlene Astell, University of St Andrews; Liz Williams, Sheffield University; Tim Adlam, University of Bath; Faustina Hwang, Reading University.

One older person in four is likely to be malnourished, which has a significant impact on their general health. Poor nutrition can have a variety of causes, such as difficulty chewing or swallowing, depression or dementia.

The researchers explained that it had been difficult to examine the links between diet and physical and mental health and mood because these were difficult to measure reliably. Most existing ways of measuring offered only snapshots and could not monitor the rate of change or distinguish between cause and effect.

The NANA project set out to collect data on nutrition, mental and physical activity and mood, and to produce a simple comprehensive assessment toolkit which was easy to use.

A multidisciplinary team worked together to develop and test the toolkit. Over 500 older people and 78 younger adults took part, along with professionals from a variety of fields. Various ways of measuring physical and mental activity, mood and food intake were explored. Older people were involved with all aspects of the design of the software developed by the researchers. Older people were then provided with touch-screen computers in their homes and invited to record their dietary intake using the software, including taking a picture of their meal before and after they ate, to record their consumption. Once the toolkit was developed, it was thoroughly tested and validated and was found to be at least as good as other methods of recording.

A wide range of older people found the technology useable and acceptable. The information collected was as good as or better than pen and paper methods and was easier to use. Older adults were comfortable recording what they ate and drank on a daily basis and were willing to record their mental and physical activity daily too.

The project showed that reliable data could be collected in people's homes. Data collected in this way had the potential to detect early signs of malnutrition and of other conditions such as psychological or emotional problems. The information could be fed back to the older people themselves, so that they could monitor their own progress, or it could be sent to their GP or a family member. NANA demonstrated how new technology could be used for ongoing assessment and monitoring; over time, it could be used to monitor the emergence of health issues.

The researchers felt that the toolkit could also have other applications; for example it could be adapted for use with children or adults with a variety of conditions. Information collected over time could represent a large data set to better understand the progression of major health conditions. Further research on the efficiency of the system in detecting change and on monitoring the impact of an intervention such as a new drug or a new regime is mooted.

35. Towards a greater understanding of biological ageing

This project aimed to increase understanding of the complicated biological mechanisms involved in ageing. Biological ageing is defined as the build-up of harmful effects in a cell, leading to a loss of function with increasing age. Teasing out the genetic and environmental factors which cause such harm is very complex. However the study of human diseases which speed up the ageing process can help to identify the molecular targets and thereby improve understanding.

Findings 35: A Combined Genetic and Small Molecule Approach to Studying the Role of the p38/MK2 Stress Signalling Pathway in a Human Premature Ageing Syndrome.

Mark Bagley, University of Sussex; Terry Davis, David Kipling and Joanna Latimer, Cardiff University.

This project examined the biology of human ageing by studying Werner Syndrome, a condition which involves the rapid ageing of cells, especially dividing cells. One protein (known as p38 MAP kinase) is known to be a key component in regulating the production of harmful molecules, but drugs targeting this protein have proved to be too toxic for practical use. If another target could be found that similarly moderates accelerated ageing, then the use of drugs to intervene in the ageing process or treat some of its effects could become a reality.

The role of a protein called MK2 was investigated to see if it had a similar effect to p38 MAPK. If so, it might potentially be used therapeutically not only in Werner Syndrome but in the ageing process itself and in some of its effects.

The researchers sought to answer key questions: does inhibiting MK2 speed up the slow growth of Werner Syndrome cells or prevent their early death? The answer appears to be 'in part'. Does inhibiting MK2 affect the ageing process when this results from oxidative stress? When an external stress (in this case hydrogen peroxide) was applied, drugs targeting MK2 did not relieve the resulting ageing whereas those targeting p38 MAPK did. Overall, the study revealed the role of the two proteins in the ageing of dividing cells.

Finally, the project examined the ethical framework for intervening in the ageing process, based on the views of seven scientists in ageing research, two in the US and five in the UK. The researchers observed that intervening in the progress of a disease in order to prevent premature death was generally accepted. Bio-gerontologists could see no fundamental difference between intervening in the course of a disease and intervening in the life span. They concluded that there were strong moral and economic arguments for intervening in detrimental aspects of the ageing process; indeed they felt that it would be unethical not to intervene if one had the possibility of doing so. They also suggested that their findings should help to counter the negative view of ageing and lead to greater inclusion of older people in mainstream policy.

Appendix 1

The New Dynamics of Ageing Programme: Older Peoples Reference Group (OPRG)

Current Members

John Barry, Mary Brown, Cynthia Conrad, Jim Harding, Anthony Hill, John Jefferey, Savita Katbamna, Teresa Lefort, Irene Richards, Elsie Richardson, Elizabeth Sclater, Mary Sinfield (Chair), Harbhajan Singh, Brian Todd.

Past Members

Diane Andrewes, Brian Booker, Janet Cullup, Iris Dodds, Christine Hamilton, David Hart, Shirley Heselton, Norman Richards, Pauline Richards, Barbara Shillabeer, Diane Smeeton, Urmila Tanna, Steve Thornett, Stephen Townsend MBE, Esther Ward, John Appleyard, Bob Bell, John Christie, Tony Carter.



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