

RTPI in Scotland's Annual Sir Patrick Geddes Memorial Lecture 2008

***The Biological Consequences of Living in Adverse Circumstances* given by Dr. Harry Burns, Chief Medical Officer for Scotland ...** at the Royal Society for Edinburgh, 22-26 George Street, Edinburgh from 6.00pm on 4th June 2008

An annotated note produced by John Rosser

Please note:

- **This is a personal annotated note taken by John Rosser** - formerly working in Development Planning, City of Edinburgh Council and now Policy Officer at the National Trust for Scotland - contact jrosser@nts.org.uk). It describes the Geddes Lecture 2008 given by Dr Burns; highlights further some of the research Dr Burns referred to in the Lecture; and it concludes with a postscript including some further observations from the author. Any additional comments from the author are put in square brackets []. Any mistakes or misinterpretation are entirely the author's – and corrections will be gratefully received by him!
- **RTPI in Scotland** is publishing this material on its web-pages to support further dialogue about the important issues and debates raised by the 2008 Geddes Lecture. We are very grateful to Dr Harry Burns for giving the Lecture; and to John Rosser for the substantial and valuable work he has done in creating this note. Any opinions stated are those of the author's. Intellectual copyright remains with Dr Burns or the specified researchers – as appropriate. The author is happy for others to use the material for non-commercial purposes only.

Introductions ...

Chairman's Welcome

Geddes' approach to analysing issues was by taking a 'panoptical view'. Geddes was very influential in the thinking of Thomas Adams, a Scot who became an adviser to Presidents Roosevelt and Hoover on public health and public improvements, and an advocate for Garden Cities. He was involved in the founding of Town Planning Institutes in the UK, America and Canada between 1914 and 1919¹.

Introduction by Stewart Stevenson MSP, Minister for Transport, Infrastructure & Climate Change

Geddes remains relevant today with our concerns for the role of the planning system and changing experience in public health now concerned with life expectancy, heart disease, cancer and obesity. Geddes' principles have helped to inform the new Planning system and recent legislation. They are also being taken up in research on developing the Building Standards

¹ <http://www.kosmoid.net/planning/adams>

consultation 'Sustainable Development Policy into Practice: New Building' – Scottish Executive 2006².

The Lecture

'The Biological Consequences of Living in Adverse Circumstances' **by Dr. H. Burns, Chief Medical Officer, Scotland**

Introduction

The talk looks at ways the environment can influence health through its impacts on social and economic circumstances and on behaviours. This is about biological impacts, for example, on healing times and understanding the molecular links; but also about comparisons of Scotland's public health ratings against the averages for Western Europe. The talk made reference to two sources in particular, Health in Scotland 2006 - Annual Report by the Chief Medical Officer [read it to see how the breadth of aspects of deprivation can still be found on a community basis] and a lecture 'Urban Vision and Public Health – Designing and Building Wholesome Places' given by Dr Howard Frumkin presented to the Glasgow Centre for Population Health (Seminar Series 2, paper 5 2006). [Links are provided through footnotes below. As well Dr Burns' work with Carol Tannahill and Russell Jones and the work of the Centre was acknowledged; see particularly one of its work pages on Healthy Urban Planning³].

Environmental Impacts on Health and Behaviour

Mortality from heart disease is falling at the same rate as it is in Finland. Finland attributes the reduction in heart disease death rate to radical changes in diet which the Finns made in the late 1970s. Scotland did not make radical changes to its diet but saw the same improvements in mortality. Scotland's burden of ill health cannot adequately be explained by its diet. Similarly, Scotland's relatively poor health record cannot be explained by its smoking rates which are lower than many countries which have higher life expectancy.

There is not a simple relationship between behaviour and health. Similarly, the gap in wealth is not always reflected in the gap in health. Over the past 30 years, Scotland has narrowed the gap in wealth distribution with England but has seen the gap in health grow. So is there an environmental component and how does it work? Everson and others carried out a study 'Hypertension Incidence is predicted by High Levels of Hopelessness in Finnish Men' in American Heart Association Journal 2000, Vol 35 pages 561-567⁴. Whilst the literature points to the impacts of depression, it is also thought that hopelessness and stress can over time lead to increases in cortisol which in turn reinforces these feelings and also leads to increasing circulating levels of fatty acids and the build up of fat in the arteries, which increase the risk of heart disease. Whilst the study was on a particular group in a particular place it suggests 'hopelessness' is strongly and inversely related to socioeconomic status. Nonetheless Dr. Burns went on to cite findings of similar symptoms in

² <http://www.sbsa.gov.uk/pdfs/SustainableDevelopmentPolicyintoPracticeNewbuildings.pdf>

³ <http://www.gcph.co.uk/content/view/25/41/>

⁴ <http://hyper.ahajournals.org/cgi/content/abstract/35/2/561>

young boys from poorer backgrounds and in lower grade civil servants who experience greater levels of stress associated with lower degrees of control over their workloads..

He also cited the work of Dr Paul Ridker⁵ who directs the Centre for Cardiovascular Disease Prevention, a translational research unit at the Brigham and Women's Hospital in Boston which focuses on the molecular and genetic epidemiology of cardiovascular diseases. This includes his pioneering work on inflammation, C-reactive protein (CRP) and thrombosis on heart disease. High sensitivity C-reactive protein (hsCRP) is a measurement of inflammation, and numerous large studies have shown that high hsCRP levels increase the risk of having a future heart attack or stroke. As a result of the data, doctors can now use hsCRP measurements in addition to screening for traditional risk factors such as high LDL or "bad" cholesterol, in order to improve the identification of patients at risk for heart disease or stroke. So lose fat ! A high level of CRP is also associated with insulin resistance and an increased risk of diabetes.

It is perfectly plausible to suggest that individuals who feel negative about the future might be stressed by the activities of daily living. However, the strong relationship between socioeconomic position and stress suggests that there is a basic biological mechanism that relates the environment in which an individual finds himself to the physiological response known as stress. Uncertain or unpredictable environments raise stress levels in young experimental animals and this effect is particularly prominent in situations in which a young animal experiences aggression. Those brought up in unpredictable environments, and who have experienced aggressive behaviours, develop patterns of cellularity in the brain that lead to upregulation of the stress response. In effect, they experience an altered pattern of the wiring of the brain which sees the hippocampus, an area of the brain involved in the storage of memory, losing the development of new cells; and the amygdala, which is associated with emotional activity such as aggression and anxiety, become more cellular and active. The net effect of lowered hippocampal and increased amygdala function is increased activity of the adrenal glands and elevated cortisol level in the blood.. So studies of what determines early brain development have recently shifted from looking exclusively at genetic effects to look more at environmental influences.

Similarly there has also been a shift to looking at the importance of early years experience as well as genes. Work at the Centre for the Developing Child at Harvard University includes the report 'The Science of Early Childhood Development – Closing the gap between what we know and what we do' (2007): the report demonstrates the importance of the impacts of social interaction in brain development in early life⁶. Genes and experience shape the 'architecture' of the developing brain, and the active ingredient is the 'serve and return' nature of children's engagement in relationships with their parents and other carers in the family and community. Brain architecture is

⁵ <http://www.crphealth.com/conf/hcp/6,6/doctor.paul.m.ridker.biography.html>

⁶ http://www.developingchild.net/pubs/persp/pdf/Science_Early_Childhood_Development.pdf

built from 'the bottom up' and their work also shows that toxic stress in early childhood is associated with persistent effects on the nervous system and stress hormone systems that can damage this architecture and lead to lifelong problems in learning, behaviour, and both physical and mental health. Creating the right conditions for early childhood development is likely to be more effective and less costly than addressing problems at a later stage. [Balbirnie]

It is thought that this research shows development of different attachment behaviours in children that in turn enhance chances of survival in the environments in which they find themselves— so if aggression is the prevailing pattern then it is the behaviour that gets adopted.

The Dunedin Cohort (New Zealand) is examining the lives of 1037 people born in 1970 in New Zealand. They identified a small group of children at age of 3 who were living in chaotic environment. In adulthood, those individuals are displaying poor social outcomes but they are also experiencing insulin resistance, high CRP and the increased risk of heart disease predicted by their early years' experience.

However, there is scope for improving this picture by changing behaviours⁷. Aaron Antonovsky's study of children shows the importance of a safe and supportive early experience to allow us to develop a sense of control and adaptation in adulthood. Failure to provide this environment would lead, Antonovsky predicted in the 1960s to elevated stress.

How to Improve the Environment and related Social Capital

SO ... what does this mean for the 'built environment'? Frumkin sees the built environment as social capital – as “the glue that binds us together” – and the opportunities it offers us for engagement / networking, healthier life styles, reducing impacts on the natural environment etc. A school will have value for education but will also have other potential values for community uses, non walk-able environments common in the USA promote sedentary life styles so pavements are good for us, a mix of uses encourages interaction etc. [the term of social capital used by Frumkin and others is positive – it shows the importance of the environment to offering 'opportunity' and gets away from 'determinism', and he also highlights the challenges that could come with climate change]. [Much of the following is taken from the lecture referred to at the start 'Urban Vision and Public Health – Designing and Building Wholesome Places by Dr Howard Frumkin presented to the Glasgow Centre for Population Health Seminar Series 2, paper 5 2006⁸ - Dr Frumkin's talk at the link below is illustrated with examples of American environments and Dr Burns used Scottish examples to illustrate poor or good environments – as Scotland and Europe have tended to avoid the extremes of some American environments]]

⁷ http://en.wikipedia.org/wiki/Dunedin_cohort

⁸ <http://www.makers.org.uk/place/frumkin%20gcph>

Frumkin started with research in the USA which shows the main health problems are due to sedentary lifestyles, being overweight and obesity; in fact a complex of inactivity and the diseases that follow from it. Injuries are also a major cause of morbidity and mortality; cardiovascular disease; asthma; problems with mental health and health disparities that distinguish some of us from others. His talk gives an alarming survey of public health trends, and he then invites all of us to think about what would be the infrastructure and planning physical environment responses that might help us address these problems.

The list of current health challenges, especially when we think forward over the horizon, pose a number of environmental design challenges. In the US the census bureau predicts that the population will double by the year 2100. Global temperature will be warmer by two or three degrees by 2050 or 2100, petroleum will become increasingly scarce and expensive, forcing us to look at different energy sources or different patterns of energy use. Water will become increasingly scarce in many areas. Health care costs will be rising. So a number of long term trends form the context into which we have to place current health patterns as well.

If we want to design communities to meet these challenges and make people healthier and happier and more fulfilled, what are some of the design considerations that need to be on our minds? Dr Burns outlined some of Frumkin's thoughts about what we need:

- have room for lots of people because populations are growing, but
- use the available space wisely because we are running out of space in many cases.
- make good places for old people because the population is aging, a very important demographic shift.
- decrease greenhouse gas emissions and take other steps to control global climate change.
- decrease petroleum dependence not only because of the political instability that that dependence denotes, but also because it is a finite resource.
- promote active lifestyles because people are too sedentary and that's bad for their health.
- prevent injuries, cardiovascular disease and asthma through safer infrastructure, through cleaner air, and so on.
- promote mental health and wellbeing. Community design features that do those things would respond to current and future public health challenges.

... and we need to rectify health disparities.

Against these requirements, Frumkin goes on to contrast the familiar pattern of American, and to a lesser extent UK, development of urban sprawl from the expansion of cities over large areas to the low density use of land, conversion of traditional land use patterns from forest and farm land to residential, low land use mix, low density – an automobile dependent method and pattern of development. [The illustrations, when they are available at footnote 11, show

roads with no or few pavements.] It's as if in the USA they intentionally engineer out physical activity. There is a need to restore health as one of the central pillars of urban planning.

Urban Design and Social Capital – some examples

Dr Burns outlined some of the interesting urban design principles raised by Dr. Frumkin and suggested that it is not just the physical qualities of urban design but the opportunities they might present for a different way of living, that there are mental and social capital issues that might be seen as well as the aesthetic. Some examples might demonstrate this.

Neighbourhoods for development throughout childhood and adolescence: It has been found from the major works of child development that there are certain infrastructural or environmental antecedents of healthy wholesome development. One of the most interesting of these to Frumkin is what he calls the 'cradle-room-house-doorstep- neighbourhood sequence'. What this refers to is the way our universe expands as we grow. This sequence is interrupted by the sprawling neighbourhood development pattern. The cul-de-sac or loop neighbourhood may be very suitable for a child or a toddler because through traffic is minimised and that gives the parents a sense of security; and it may be objectively safer for the children. But by the time the child gets to be ten or twelve years old and is ready to explore on a larger scale – it's a normal development pattern, it gives the child independence, a sense of geographic orientation, a sense of judgement – a child is prevented from doing that. So there is a developmental arrest if you will. Could that, he asks, be a part of what is apparently an increasing incidence of depression among teenagers? Putting it differently, are we designing neighbourhoods so that they are optimally wholesome for children to develop normally throughout the *entire development sequence* from childhood to adulthood?

Places of the heart: Another example Frumkin gives are about what he calls 'Third places' or 'places of the heart': places that aren't home and aren't work, but are places where we can congregate and meet people; cafes, sidewalks, public squares and parks. In many, many suburban developments that are privately driven, this part is left out. This was an ingredient of traditional city and town planning that seems to be gone. These places contribute to social capital.

He also raises the importance of integrating affordable housing into mixed tenure neighbourhoods – see below [something which planning policies in Scotland have been trying to address].

Urban Sprawl and Social Capital

How might 'sprawl' play a role in eroding social capital? Well, in the first place, the more time people spend commuting over large distances, the less time they have available to be involved in civic activities and to be engaged. This is a simple question of algebra. In the second place, the question of 'ageing in place' arises. If you move with your young family to a suburban neighbourhood you might have a half acre of land, a little garden, three bedroom house that is perfectly suitable as you raise the kids. But when the

kids are grown and gone to university, you're ready to downsize. Now in a conventional town or city, as we have lived in traditionally for centuries, there'd be a variation in housing. You'd be able to move down the block or around the corner to a smaller home. In a large homogenous residential tract you don't have that option and need to leave the community altogether, so preventing this phenomenon of 'ageing in place' and undermining the social capital to which that continuity would contribute.

So there is a range of ways in which this pattern of transportation and land use called sprawl might affect and undermine health. What do we do about it? He finishes up by talking about a couple of development patterns that are catching on in the States, catching on in many other parts of the world called "smart growth" or "new urbanism." This is really nothing new, this is a rediscovery of the old and time tested, but it is being approached with new kinds of health data in mind and with new loyalty to help so called 'smart growth'. Some local jurisdictions (local authorities) in the USA are doing smart growth measures as matters of public policy.

These include policies for mixed land use, higher density use of land, using densities that traditionally prevailed in cities and towns before the advent of the automobile balanced by greenspace preservation [useful to note here that in the US what they mean by higher density - 20 houses per acre - is very different to what happens in the UK]. One of the impulses to move to the suburbs is to have access to greenery, people love that, but there is no reason that it can't be provided in urban areas too as long as it's planned for. Transportation options so that public funds go not only into roadways, but also in a balanced way into pedestrian infrastructure, multi-use trails, and transit, parks, public spaces and affordable housing to address that issue of disparities. One of the problems in the States is that as redevelopment occurs in previously desolate urban areas where only poor people are living, those people are pushed out in a process called gentrification and they then have no good place to live. So these redevelopments that are taking place now need to take place with very explicit focus on affordable housing for everybody across the income spectrum.

Dr Burns suggested that this should be the assignment for all the urban planners in the room.

Final thoughts

In conclusion, Dr Burns pointed to Ramsay Gardens as a place created by Geddes to draw these themes together. He reminded us that Geddes perspective had also been influenced by Darwin and the theory of evolution. This may have helped Geddes with developing his 'Leaf' quotes. The first is an extract from Geddes' farewell lecture to his students at University of Dundee and is part of the background to the University motto, "*By creating we think, by living we learn*", and originally written by Geddes for a Town Planning Conference paper he gave in Amsterdam in 1924⁹ :

⁹ http://www.dundee.ac.uk/main/about_patrick_geddes.htm

"How many people think twice about a leaf? Yet the leaf is the chief product and phenomenon of Life: this is a green world, with animals comparatively few and small, and all dependent upon the leaves. By leaves we live.

But growth seems slow: and people are all out for immediate results, like immediate votes or immediate money. A garden takes years and years to grow - ideas also take time to grow, and while a sower knows when his corn will ripen, the sowing of ideas is, as yet, a far less certain affair.

Star-wonder, stone and spark wonder, life-wonder, folk-wonder, these are the stuff of astronomy and physics. Of biology and the social sciences... To appreciate sunset and sunrise, moon and stars, the wonders of the winds, clouds and rain, the beauty of woods and fields - here are the beginnings of natural sciences.

[But] We need to give everyone the outlook of the artist, who begins with the art of seeing - and then in time we shall follow him into the seeing of art, even the creating of it. In the same way the scholar and the student may be initiated ... into the essential outlook of the astronomer and the geographer, of the mathematician and the mechanic, the physicist and the chemist, the geologist and the minerologist, the botanist and the zoologist, and thence more generally, of the biologist. Next, too, the anthropologist ... and the economist.

But this general and educational point of view must be brought to bear on every specialism. The teacher's outlook should include all viewpoints... Hence we must cease to think merely in terms of separated departments and faculties and must relate these in the living mind; in the social mind as well - indeed, this above all. And so with art inspiring industry, and developing the sciences accordingly, beyond the attractive yet dangerous apples of the separate sciences, the Tree of Life thus comes into view."

For the full text see Amelia Defries, The Interpreter: Geddes, London, 1927. This selection by Professor Murdo Macdonald.

The second is as follows:

"This is a green world, with animals comparatively few and small, and all dependent on the leaves. By leaves we live. Some people have strange ideas that they live by money. They think energy is generated by the circulation of coins. Whereas the world is mainly a vast leaf colony, growing on and forming a leafy soil, not a mere mineral mass:

*and we live not by the jingling of our coins, but by the fullness of our harvests.*¹⁰

So health research needs to be about a complex series of interactions between people and the environment. The effects of stress can be modified by social and environmental contexts. Economic well being also helps to develop healthy and supportive behaviours and supporting activities. Improving medical research methods and technology are allowing us to stitch together not just biological but social and environmental factors in our understanding of health.

One example of this is work being done on History of Interventions. The NHS Scotland web site Data Dictionary¹¹ sets out aspects to be considered in an assessment method and scoring system for interventions for patients with mental health problems. These would seem to be a practical example of how the NHS is trying to implement the sort of thinking that Dr. Burns talked about. This method takes into consideration the following aspects:

- Assessment
- Care Planning and review
- Social Support
- Housing support
- Benefits/ financial support
- Healthy living management and education
- Medication management
- Physical therapies
- Psychosocial interventions
- Legal actions
- Risk management
- Activities of daily living support
- Spiritual support
- Other

The Health Service is still testing hypotheses on the importance of Supportive Environments and Social Support, and in particular their importance in Child Development [see postscript below].

Open Forum Discussion Themes

Does this work re-emphasise the importance of area approaches? Recent research on Glasgow area based policies of the 70/80's had been critical about the durability of the results in relation to investment and seemed to discredit area based approaches. It is important to remember some of the reasons about why such approaches had come about. Many communities had been dominated by single industries: there is a need to move from historic and generally 'monolithic' communities to more mixed and diverse communities; and with it gain a better understanding of intergenerational impacts. These need more research.

¹⁰ <http://www.ballaterscotland.com/geddes/pgprofile.htm>

¹¹ <http://www.datadictionaryadmin.scot.nhs.uk/isddd/18837.html>

Appendix 1: Postscript from the Author

The Medical Research Council web page¹² for the Glasgow Centre for Population Health makes reference to several continuing projects including the following:

"Gowell Project

We are collaborating with other Unit researchers involved in the [GoWell project](#). This is investigating how the planned £1 billion investment in Glasgow's homes and communities will impact on the health and wellbeing of people in some of the city's most deprived areas. It is part-funded by the [Glasgow Housing Association](#), along with Communities Scotland, NHS Greater Glasgow and NHS Health Scotland. GoWell started in 2006. It involves around 7,000 households and is running for the next ten years. Glasgow people are being asked about their experiences of community regeneration projects before, during and after the investments take place. Changes in features of the environment are being studied, and our work on [the location and social distribution of amenities and services in Glasgow City](#) is contributing to that activity. Further information is available [here](#).

The Twenty -07 Localities Study

In our work involving the Twenty-07 Localities Study we have argued that levels of recreational facilities and more pleasant or unpleasant local environments might affect the extent to which people undertake health behaviours such as physical activity. However, there is a need to explore these issues in greater depth through a more qualitative approach which will obtain people's own experiences and views of the ways in which the local environment might influence their behaviour (or not). We are therefore undertaking a collaborative project, with partners at GCPH and NHS Greater Glasgow and Clyde, which involves interviewing residents in our [Twenty-07 Localities in Glasgow](#) about their perceptions and use of physical activity opportunities including the surrounding general environment, green space and facilities such as swimming pools and sports centres. To supplement residents' views and experiences, we are also sourcing and mapping existing data on green space, leisure facilities and recreational facilities in these neighbourhoods, as well as conducting focus groups in the two localities."

¹²http://www.sphsu.mrc.ac.uk/research_project.php?prjid=GCPH&bcrumbs=SS.COLL