The biology of poverty and social chaos

RACP

17th May 2016
How doctors can change the world

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@harryburns16
The pathogenesis paradigm

“Health is a complete state of physical, mental and social wellbeing and not merely the absence of disease or infirmity”

WHO 1948
Wellbeing

- What is it?
- What causes it?
- How we create it?
- Why do we need it?
A new definition of health

Just as environmental scientists describe the health of the earth as the capacity of a complex system to maintain a stable environment within a relatively narrow range, we propose the formulation of health as the ability to adapt and to self manage.

Huber et al 2011
What people believe about Scotland’s health

- The Scots are unhealthy
- It’s because they smoke a lot
- They eat the wrong kind of food
- They drink too much
- If only they adopted healthy habits, they would be healthy
- Only ONE of these statements is true!
Life expectancy trends

Life expectancy: Scotland & other Western European Countries, 1851-2005
Source: Human Mortality Database

Scotland
Prevalence of smoking by country, in 15 year olds by sex, 2000/01, Europe

% regular smokers

Boys
Girls

Ukraine, Lithuania, Germany, Estonia, Slovenia, Latvia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, Estonia, Finland, Hungary, Austria, Poland, Switzerland, Spain, Croatia, Netherlands, Belgium, France, Czech Republic, 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Smoking prevalence - Males

- Sweden (16-84, 2004)
- Finland (15+, 2003)
- Scotland (16+, 2004)
- Ireland (18+, 2002)
- Malta (15+, 2002)
- France (15+, 2003)
- Netherlands (15+, 2004)
- Denmark (15+, 2003)
- Czech Republic (15+, 2004)
- Italy (15+, 2002)
- Belgium (18+, 2000)
- Luxembourg (15+, 2003)
- Spain (16+, 2001)
- Poland (15+, 2000/02)
- Hungary (18+, 2003)
- Austria (14+, 2004)

Percentage smoking
Smoking prevalence - Females

- Italy (15+, 2002)
- Malta (15+, 2002)
- Sweden (16-84, 2004)
- Finland (15+, 2003)
- Czech Republic (15+, 2004)
- France (15+, 2003)
- Spain (16+, 2001)
- Scotland (16+, 2004)
- Poland (15+, 2000/02)
- Netherlands (15+, 2004)
- Denmark (15+, 2003)
- Luxembourg (15+, 2003)
- Ireland (18+, 2002)
- Belgium (18+, 2000)
- Hungary (18+, 2003)
- Austria (14+, 2004)

Percentage smoking

0 10 20 30 40 50 60
Coronary heart disease mortality
Men aged 15-74 years

Age-standardised mortality per 100,000
Slope index of inequality
All cause mortality, men 65-69

Mean = 2694

2763 / 2694 = 1.025
Male inequalities, all causes, all ages
Slope index of inequality breakdown by cause of death

SII = 2763

SII = 792

SII = 1971

All cause

IHD

Other causes
Male inequalities, all ages, by cause

![Graph showing the slope index of inequality divided by mean rate for male inequalities, all ages, by cause. The graph compares IHD and All other causes across different age groups.](image-url)
Relative inequalities in mortality by cause
Men, Scotland 2000-02

- Chronic liver disease
- All neoplasms
- Disorders due to use of drugs
- All other causes
- Suicide
- Assault
- Accidents
- Disorders due to use of alcohol
- Chronic lower respiratory diseases
- Cerebrovascular disease
- Ischaemic Heart Disease
Chronic liver disease, including cirrhosis

Mortality from chronic liver disease, incl. cirrhosis, age standardised rates among men 15-74 years
Scotland in context of maximum, minimum, and mean rates for 16 Western European countries
Source: WHOSIS (April 2012)

ICD 6/7: A105
ICD8: A102
ICD9: B347
ICD10: K70, K73, K74

Workers in the 1950s
More liveable housing?
Salutogenesis
An assets approach

Gratitude
(McGullough)

Self-efficacy
(Bandura)

Hardiness
(Kobasa)

Empathy
(Eisenberg)

Humour
(Martin)

Coping
(Lazarus)

Learned resourcefulness
(Rosenbaum)

Learned optimism
(Seligman)

Learned hopefulness
(Zimmerman)

Sence of coherence
(Antonovsky)

Emotional intelligence
(Goleman, Akerjordet et al)

Cultural capital
(Bourdieu)

Quality of Life
(Lindström)

Connectedness
(Blum)

Social capital
(Putnam)

Resilience
(Werner)

Flourishing
(Keyes)

Empowerment
(Freire)

Will to meaning
(Frankl)

Interdiciplinarity
(Klein)

Attachment
(Bowlby)

Ecological system theory
(Bronfenbrenner)

Locus of control
(Rotter)

Wellbeing
(Diener)
Aaron Antonovsky 1923-1994
“.....expresses the extent to which one has a feeling of confidence that the stimuli deriving from one's internal and external environments in the course of living are structured, predictable and explicable, that one has the internal resources to meet the demands posed by these stimuli and, finally, that these demands are seen as challenges, worthy of investment and engagement.”

Antonovsky 1979
For the creation of health....

....the social and physical environment must be:
  u Comprehensible
  u Manageable
  u Meaningful
  u ......or the individual would experience chronic stress
Evening Cortisol Levels Increase with Months of Orphanage Rearing *
STRESS AND GRADE OF EMPLOYMENT: MEN

Salivary Cortisol

Steptoe et al. 2003, Psychosomatic Medicine, 65, 461-470
Risk of death
- by level of hopelessness

Everson et al 1996
PERCEIVED CONTROL IN NATIONAL SAMPLES AND ALL CAUSE MORTALITY

SDR all causes (per 100,000)

CONTROL (AGE-SEX ADJUSTED)

Pikhart, Bobak et al 2000
CSF CRF concentrations in differentially-reared juvenile primates:

CRF is a "fear" neuropeptide

Copolan et al, 1996, PNAS, USA

Group effect: P < .0001
The Human Brain Under Stress: key brain regions

**Prefrontal cortex**
- Executive function, working memory
- Atrophy

**Hippocampus**
- Contextual, episodic, spatial memory
- Atrophy

**Amygdala**
- Emotion, fear, anxiety
- Hypertrophy, later atrophy
pSoBid: Choice reaction time

![Bar chart showing reaction times across different age groups.](chart)

- **Age (years)**: 35-44, 45-54, 55-64
- **Reaction Time (milliseconds)**: 0, 200, 400, 600, 800, 1000, 1200
- **Legend**:
  - MD
  - LD

Significance: p<0.001

*Note: The chart illustrates a significant increase in choice reaction time with age, particularly noticeable in the 55-64 age group.*

*Source: NHS Scotland*
MAOA – “The warrior gene”
Överkalix

Oversupply of food affected life expectancy of grandsons not granddaughters
Epigenetic effects across generations

- Overkalix – nutritional experience as a child can increase risk of heart disease which is inherited by sons and grandsons
- Rachel Yehuda – PTSD experienced during pregnancy after 9/11 led to abnormal stress responses in babies
- Pregnant women in Lanarkshire in the 1950s put on a carb free diet. Children and grandchildren have high incidence of hypertension
Adverse childhood events study

- Physical/sexual/emotional abuse
- Neglect (physical/emotional)
- Domestic substance abuse
- Domestic violence
- Parental mental illness
- Parental criminality
Adverse childhood events risk of alcoholism

Odds ratio

Hillis et al 2011
Adverse childhood events risk of perpetrating violence
Boys experiencing physical abuse

Duke et al 2010
The Dunedin cohort

- 1000 children recruited in late 1972/3
- At age 3, “at risk” children identified on the basis of chaotic circumstances, emotional behaviour, negativity and poor attentiveness
- As adults, those “at risk” were more likely to:
  - be unemployed
  - have criminal convictions (especially for violence)
  - been pregnant as a teenager
  - have a substance abuse problem
  - exhibit signs of insulin resistance and metabolic syndrome
Cumulative Proportion of Individuals not diagnosed with a Major Disease with Age


Differences are independent of Deprivation
ACE and morbidity
(adjusted odds ratio, 4+ ACE)

Glasgow excess mortality
(cause-specific SMR, compared to Liverpool & Manchester)
The cycle of violence

“Childhood abuse and neglect have a significant impact on the likelihood of arrest for delinquency, adult criminality, and violence. By the age of 32 years, almost half of the victims of abuse and neglect were arrested for a nontraffic offense.”

“By responding to incidents of child abuse and neglect, health care professionals can play an important role in preventing future violence.”

Maxfield and Widom 1996
Economic cost of child maltreatment

“The total lifetime economic burden resulting from new cases of fatal and nonfatal child maltreatment in the United States in 2008 is approximately $124 billion in 2010 dollars. This economic burden rivals the cost of other high profile public health problems, such as stroke and Type 2 diabetes (Fang et al., 2012).”
The cycle of alienation

Initial event: Chaotic early years

Unequal outcomes:
- Mental health problems
- In education offending health

Consequences:
- Loss of self efficacy, esteem, control
- Worklessness Poverty

Alienation
Reversing the effects of a difficult life

- The evidence supports
  - Physical activity
  - Mindfulness
  - Having strong social connections
Zaatari Refugee Camp, Jordan
Demography is changing our world

The world population will exceed **10 billion** by 2100

**Africa will grow the fastest**
becoming 4x more populous than Europe
and nearly as populous as Asia

By 2100, Afghanistan will be larger than Russia
and Niger will be larger than both

Europe will be 7% of world population –
and 34% will be over 60

**9 countries** will account for over half of population growth
Ethiopia, The Democratic Republic of Congo, Indonesia, India, Nigeria, Pakistan, Tanzania, Uganda and the U.S.

WORLD BANK GROUP
Demography is changing our world

World's largest cities in 2050

- Mumbai, India: 42.4 million
- Delhi, India: 36.2 million
- Dhaka, Bangladesh: 35.2 million
- Kinshasa, Democratic Republic of the Congo: 35 million
- Kolkata, India: 33 million
- Lagos, Nigeria: 32.6 million
The challenges of urbanization

Globally, 1 in 3 urban dwellers—a billion people—live in slums

⅓ of Asia’s and ⅔ of Africa’s urban dwellers live in slums

Many slum dwellers fall between cracks, lacking rights, voice and services
Jimmy Reid 1971

Trade Union leader

Elected by students as Rector of Glasgow University
"Let me right at the outset define what I mean by alienation. It is the cry of men who feel themselves the victims of blind economic forces beyond their control. It's the frustration of ordinary people excluded from the processes of decision making. The feeling of despair and hopelessness that pervades people who feel with justification that they have no real say in shaping or determining their own destinies...."
Joseph Townsend 1739-1816

“Hunger will tame the fiercest animals. “It will teach decency and civility, obedience and subjection … it is only hunger which can spur and goad the poor on to labour.”
“Here is what we seek: a compassion that can stand in awe at the burdens the poor have to carry rather than one that stands in judgment at how they carry them.”

— Gregory Boyle
What do you mean, “it’s a bit muddy”?