

Tracking cardiovascular health across the life course

Understanding how markers of CV health change across life and the characteristics associated with deviation from 'normal' age-related change is key to fully understanding disease development

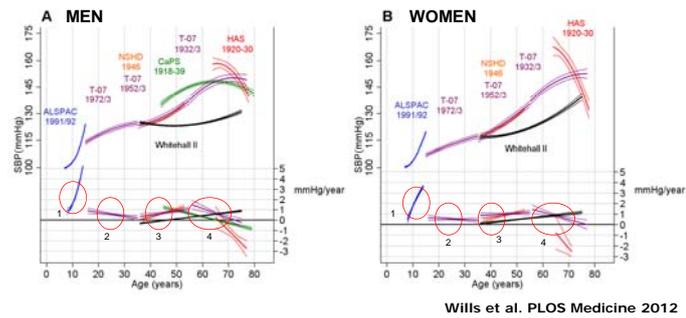
We have collected markers of cardiovascular (CV) risk and health across life, most recently at age 69

- **Body mass index** (a marker of adiposity derived from height and weight): measured 13 times from age 2
- **Heart rate**: measured 8 times from age 6
- **Blood pressure**: measured 5 times from age 36
- **Cholesterol** and **HbA1c** (a marker of diabetes risk): measured 3 times from age 53
- **CV blood biomarkers** at ages 60-64 and 69

At clinic visits at age 60-64 we obtained measures of **cardiac and vascular structure and function**

We collect **CV events** (e.g. heart attacks) from self-reports, confirming diagnoses through hospital admission and GP notes

Mean systolic blood pressure (mmHg) trajectories and velocities (mmHg/year) in each of 8 cohorts



Wills et al. PLOS Medicine 2012

Using systolic blood pressure (SBP) measures in NSHD and 7 other cohorts covering different but overlapping periods of life we identified 4 phases of SBP change (see figure):

1. rapid increase during adolescent growth
2. gentler increase in early adulthood
3. midlife acceleration beginning in the fourth decade
4. deceleration in later adulthood

Ideal Cardiovascular Health (Life's Simple 7)

R Caleyachetty, R Hardy

Life's Simple 7 is a new measure that can be used to monitor the population's cardiovascular health status

"Ideal cardiovascular health" is being able to meet "Life's Simple 7"

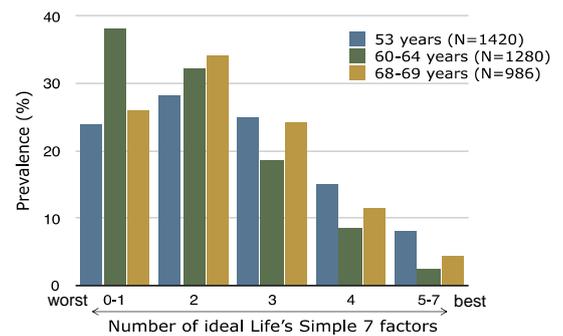
Life's Simple 7

- Never smoked, or quit more than a year ago.
- Having a BMI (body mass index) of < 25.
- Exercise at moderate level for at least 150 mins or at intense level for 75 mins /week
- Healthy diet
- Untreated total cholesterol <5.2 mmol/L
- Untreated BP <120/80
- Untreated fasting glucose <5.55 mmol/L

A score based on all 7 components reflects the degree to which an individual's health behaviors and health factors are in accord with ideal cardiovascular health

Better cardiovascular health, as measured by Life's Simple 7, has been associated with lower risk of cardiovascular disease (CVD)

Percentage (without diagnosed CVD) with each score of the Life's Simple 7 measure at ages 53, 60-64 and 69



Caleyachetty et al. In progress

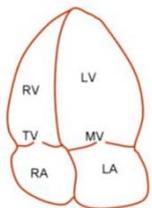
Ideal cardiovascular health declined from age 53 to 60-64, while preliminary analysis of the age 69 data suggests that ideal cardiovascular health (among those who have not been diagnosed with CVD) has improved since 60-64

8% met 5 or more of the targets at age 53, with this figure being 4% at age 69

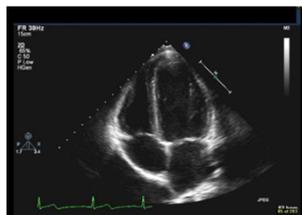
Emphasis on establishment of ideal cardiovascular health early in life course is important for maintenance of ideal cardiovascular health throughout life

Cardiac and vascular structure and function at age 60-64

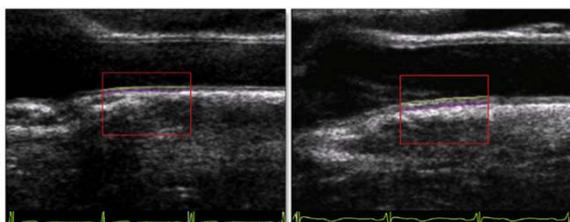
R Hardy, A Ghosh, W Johnson, A Hughes, M Charakida, S Masi, J Deanfield, E Murray, P Whincup



The 4 chambers of the heart



Echocardiogram



Common carotid artery intima-media thickness

We have investigated life course risk factors associated with measures of cardiac and vascular structure and function

- A more healthy **cardiac structure** at age 60-64 was related to:
- a slower rise in midlife blood pressure
 - less time spent overweight or obese in childhood and adulthood
 - later age at menarche in females
 - more advantaged socioeconomic circumstances in childhood and adulthood

- A narrower **carotid intima-media thickness (cIMT)**, indicating less atherosclerosis, was related to:
- less time spent overweight or obese in adulthood
 - taller childhood height in males only
 - slower shortening of telomere length from age 53 to 60-64 (telomeres are the caps at the end of each strand of DNA that protect chromosomes from deterioration)