Nature or nurture: what really drives differences in life expectancy?

Ian Edelist FSA FCIA
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Club Vita

Proper noun, [kluhb vee-tuh], ˈkluːb vē-tə

1. Center of excellence for improving understanding of human longevity.
2. Community of organizations with a shared interest in longevity and belief that the ‘bigger’ the data, the lower the (statistical) noise.
3. Provider of longevity risk informatics to support pension funds’ risk management strategies and enable market innovation.

Club Vita is an independent data utility, supporting pension funds, advisors, insurers & asset managers
Nature

Don’t long-lived ancestors give some a head start?
All animals are equal, but some animals are more equal than others.

- Published in 1945
- George Orwell died in 1950, aged 46, from a burst pulmonary artery

George Orwell, English writer
Not, really. We’re born pretty equal ….

<table>
<thead>
<tr>
<th>Study</th>
<th>Genetic Bit</th>
<th>The Rest</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herskind et al., 1996</td>
<td>26%</td>
<td>74%</td>
<td>Danish twins</td>
</tr>
<tr>
<td>Ljungquist et al., 1998</td>
<td>33%</td>
<td>67%</td>
<td>Swedish twins</td>
</tr>
<tr>
<td>Gavrilova et al., 1998</td>
<td>18%</td>
<td>82%</td>
<td>Royal families</td>
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<tr>
<td>Mitchell et al., 2001</td>
<td>25%</td>
<td>75%</td>
<td>Amish</td>
</tr>
<tr>
<td>Skytthe et al, 2003</td>
<td>25%</td>
<td>75%</td>
<td>Danish twins</td>
</tr>
<tr>
<td>Joshi et al (in prep)</td>
<td>16%</td>
<td>84%</td>
<td>Scottish nuclear families</td>
</tr>
</tbody>
</table>

- Suggests that only 20% of lifespan variation is explained by our genetic make-up
- Lifespan variation is driven more by nurture than nature
Your genes at birth have little effect on your lifespan

- Genetics is helping us to understand the aging process
- You can now get an estimate of your biological age.
- And these insights are already leading to new therapies for cancer, one of the major causes of death

But “hacking” the ageing process would extend lifespans, potentially materially so
Nurture

So, what explains the other 80%?
The importance of three healthy habits ….

54% of fall in deaths from heart disease attributable to decline in smoking¹.

The harmful use of alcohol is a causal factor in more than 200 disease and injury conditions².

Eradicating prolonged sedentary behaviour might avoid c.10% of UK deaths³.

²: Alcohol – Key Facts, WHO, Sept 2018
The rise and fall of smoking: 1900-2010

Decline in men smoking since 1970

Age-adjusted prevalence of current cigarette smoking among adults aged 25 and over, by sex, race, and education level: United States, selected years 1974–2015 (CDC)
Decline in women smoking since 1970

Age-adjusted prevalence of current cigarette smoking among adults aged 25 and over, by sex, race, and education level: United States, selected years 1974–2015 (CDC)
Whilst exercise rises with education….

Physical activity by educational attainment

Proportion meeting recommended guidelines

- Less than high school
- High school
- Some college
- College graduate

Prevalence of meeting the combined aerobic and muscle-strengthening physical activity guidelines, and prevalence trends among adults — National Health Interview Survey, United States, 2008, 2012, and 2017

https://www.cdc.gov/mmwr/volumes/68/wr/mm6823a1.htm#F1_down
Obesity declines sharply with education

Percentage of Adults classed as Obese, 2017

- Less than high school
- High school graduate
- Some college or technical school
- College graduate

Nurture

Do our habits vary regionally?
Lots of regional variation in drinking habits

https://www.cdc.gov/brfss/brfssprevalence/
Longevity variations are much more granular

Explore your own area online: 
http://maps.clubvita.us
Bringing it all together ..
US pension plan member diversity

Life expectancy from 65

Healthy annuitants

- ZIP+4
- $ Collar

79.1 -> 87.8
Including “age only” disabled curve

80.2 -> 87.8
7.6 years
3¾ yrs

82.5 -> 88.4
5.9 years
3½ yrs

Life expectancy from 65

Including “age only” disabled curve

81.8 -> 88.4
1½ yrs
1 yrs

Please see “Zooming in on ZIPcodes” paper for more details

87.8
88.4
ZIP codes help to shrink liabilities

Impact of moving from RP06 to 9 digit ZIP US VitaCurves (both MP18 improvements)

To understand how, please see our “Zooming in on ZIP codes” paper at www.clubvita.us
In summary

✓ Nurture is much more important than nature
✓ Differences largely explained by smoking, alcohol and exercise
✓ Habits are not uniform across the country
✓ ZIP codes capture the diversity
✓ Potential for more accurate liability valuations, with funding improvements for many
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www.clubvita.us
ian.edelist@clubvita.net

Club Vita US LLC
221 River Street 9th Floor, Hoboken, NJ 07030