A Life Course Approach to Understanding US Mid-Life Mortality: Commentary

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Washington, DC 20001
Key background issues in today’s talks

Life course approach is fundamentally important to understand population trends and differences in mid-life mortality
- But...the task isn’t as easy as it sounds

Researchers have a better conceptual grasp of the life course origins of adult mortality
- But...are there different life course “signals” and “pathways” for mid-life mortality compared to late life mortality?
- How life course “signals” and pathways change over time is poorly understood
- Where the conceptual framework is now leading us in terms of understanding and anticipating long-term trends in the association is unclear

Increasingly Americans reside in “Multiple Americas,” resulting in different life course trajectories and exposures
- Growing need to understand spatial-temporal life course influences on mid-life mortality
- Life ... and death ... are being driven by increasingly complex processes
Some basic facts about mid-life mortality
Life Expectancy at Age 25 by Years of Schooling, Non-Hispanic Whites 1990-2010 (Sasson 2016)
Age decomposition of change in life expectancy by gender and years of schooling, non-Hispanic whites 1990–2010

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0163412
### Leading Causes of Death and Numbers of Deaths, 45-64 Years: United States, 1980 and 2014

<table>
<thead>
<tr>
<th>1980 Rank</th>
<th>Cause of Death</th>
<th>Deaths (%)</th>
<th>2014 Rank</th>
<th>Cause of Death</th>
<th>Deaths (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All causes</td>
<td>425,338</td>
<td></td>
<td></td>
<td>524,725</td>
</tr>
<tr>
<td>1</td>
<td>Heart</td>
<td>34.9</td>
<td>1</td>
<td>Neoplasms</td>
<td>30.5</td>
</tr>
<tr>
<td>2</td>
<td>Neoplasms</td>
<td>31.9</td>
<td>2</td>
<td>Heart</td>
<td>20.8</td>
</tr>
<tr>
<td>3</td>
<td>Cerebrovasc</td>
<td>4.7</td>
<td>3</td>
<td>Unint. injuries</td>
<td>7.4</td>
</tr>
<tr>
<td>4</td>
<td>Unint. injuries</td>
<td>4.3</td>
<td>4</td>
<td>Chronic liver</td>
<td>4.1</td>
</tr>
<tr>
<td>5</td>
<td>Chronic liver</td>
<td>3.8</td>
<td>5</td>
<td>COPD</td>
<td>4.0</td>
</tr>
<tr>
<td>6</td>
<td>COPD</td>
<td>2.7</td>
<td>6</td>
<td>Diabetes</td>
<td>3.7</td>
</tr>
<tr>
<td>7</td>
<td>Diabetes</td>
<td>1.9</td>
<td>7</td>
<td>Cerebrovasc</td>
<td>3.3</td>
</tr>
<tr>
<td>8</td>
<td>Suicide</td>
<td>1.7</td>
<td>8</td>
<td>Suicide</td>
<td>3.1</td>
</tr>
<tr>
<td>9</td>
<td>Pneumonia</td>
<td>1.4</td>
<td>9</td>
<td>Septicemia</td>
<td>1.6</td>
</tr>
<tr>
<td>10</td>
<td>Homicide</td>
<td>0.9</td>
<td>10</td>
<td>Pneumonia</td>
<td>1.5</td>
</tr>
</tbody>
</table>
An introduction to a life course conceptual framework of adult mortality
Figure 1. An Incomplete Life Course Framework to Investigate Mid-Life Mortality
1. But...are there different life course “signals” and “pathways” for mid-life mortality compared to late life mortality?

- Behavioral and exposure related risks linked to external causes (e.g., accidents, injuries and poisonings)
  - Risky behaviors
  - Risky occupations

- For some mortality outcomes (particularly internal causes), mid-life mortality may reflect disparities in *lifetime* risks, rewards, and exposures
  - Weathering
  - Mortality for more advantaged groups “postponed” until late-life

What is the role of early life conditions for mid-life mortality?

- External causes: Indirect through adult behaviors, relationships, and achievement?
  - ACES → Learning → Educational Attainment → Social Relationships → Depression → Substance Use → Drug overdose
  - Multiple opportunities for intervention?

- Internal causes: Part of the accumulation of biological risk
2. How life course “signals” and pathways change over time is poorly understood. Changes in the risk of death by educational attainment since the 1980s (Montez et al. 2012; Hayward et al 2015)
3. Where the conceptual framework is now leading us in terms of understanding and anticipating long-term trends in the association is unclear

**New forces from childhood**
- The rise in childhood obesity
- Growing prevalence of children reared in poverty
- Instability in parental social relationships
- Economic insecurity

**New forces from adulthood**
- Growing adult obesity
- The hollowing out of the Middle Class and economic insecurity
- Volatility in family relationships, especially in the working class and poor
- Growing economic insecurity
- The “unraveling” of quality of life for working class Americans
The life course in historical context – macro societal influences on our bodies
<table>
<thead>
<tr>
<th>Date Range</th>
<th>Events</th>
</tr>
</thead>
</table>
| 1901-1910  | - Public Health Service Established  
           - US Meat Inspection Act  
           - Existence of different blood types discovered |
| 1911-1920  | - Refrigerators for home use  
           - Tetanus vaccine developed  
           - Rabies and typhoid vaccines licensed in US  
           - Spanish flu epidemic |
| 1921-1930  | - Vitamins discovered  
           - Insulin (best treatment of diabetes) was discovered  
           - Diptheria & tetanus vaccines recommended for children  
           - TB vaccine developed  
           - Penicillin discovered  
           - Frozen food processes discovered |
| 1931-1940  | - TVA founded & Rural Electrification Act  
           - Social Security Act  
           - Minimum Wage  
           - A shift in home to hospital deliveries  
           - DDT invented |
| 1941-1950  | - Mass production of penicillin  
           - Influenza vaccine licensed  
           - Risk factors identified for heart disease  
           - Start of computer age  
           - CDC established  
           - Water fluoridation started |

**Technological innovation and rise of New Deal**
1961-1970

- National fluoride recommendations
- Measles vaccine licensed
- Beginning of 12-years escalation in post-secondary educational enrollment
- U.S. Surgeon’s report on smoking and health
- War on Poverty, Civil Rights Act, Voting Act, Food Stamp Act, Older Americans Act
- Head Start
- Higher Education Act provided need-based financial assistance
- Medicare and Medicaid Established
- Cigarette warning labels
- FDA approved the first combined oral contraceptive

- Beta blockers invented to lower BP and risk of heart attacks and strokes
- Highway Safety Act
- National Traffic and Motor Vehicle Act
- Mumps vaccine licensed
- Mammography developed
- First humans walked on the moon
- EPA & OSHA established
- DDT banned

The Great Society: Culmination of the New Deal
<table>
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<tr>
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<tbody>
<tr>
<td>• Divorce rates began to escalate</td>
<td>• FDA approved first commercial statin</td>
</tr>
<tr>
<td>• Car airbags invested</td>
<td>• Women earned more bachelors degree than men for the 1st time</td>
</tr>
<tr>
<td>• WIC program made permanent</td>
<td>• Commercial internet providers emerged</td>
</tr>
<tr>
<td>• Safe Drinking Water Act</td>
<td>• Start of US obesity epidemic</td>
</tr>
<tr>
<td>• First drive-thru McDonalds</td>
<td>• Food labeling legislation enacted</td>
</tr>
<tr>
<td>• Microsoft founded</td>
<td>• Human Genome Project begins</td>
</tr>
<tr>
<td>• Apple 1 was built</td>
<td>• Federal devolution in power begins in full swing with states becoming</td>
</tr>
<tr>
<td>• Pneumonia vaccine licensed</td>
<td>responsible for major social programs</td>
</tr>
<tr>
<td>• Antiviral drugs developed</td>
<td>• State differences in life expectancy begin to accelerate</td>
</tr>
<tr>
<td>• New Federalism (Nixon &amp; Reagan) with states reclaiming some power over</td>
<td>• State differences in life expectancy began to accelerate</td>
</tr>
<tr>
<td>federal programs</td>
<td></td>
</tr>
<tr>
<td>• State differences in life expectancy began to emerge</td>
<td></td>
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</tbody>
</table>
Federal Devolution Revolution in full swing

1991-2000
- Introduction of pneumococcal conjugate vaccine and routine rotavirus vaccination
- Rapid rise in Americans’ internet use
- Google was incorporated
- BlackBerry smartphone was launched
- Genetically engineered crops developed for commercial use
- Large increase in immigration from Latin America
- 1996 Welfare Reforms created as part of devolution revolution—states spend federal welfare grants at their discretion (TANF & AFDC)
- State EITCs get rolling

2001-2010
- The genome is sequenced
- Strides made in stem cell research
- Major strides made in controlling HIV
- Targeted cancer therapies
- First hybrid car
- Smartphone use rapidly grew
- Continued expansion of state EITCs (but varying levels of generosity)
So...where are we and where do we go from here?

Key life course associations are highly dynamic – and should be!

Dynamic life course associations are endogenous to macro institutional forces that play out over long periods of time

Within- and across-cohort dynamics

Investigating these associations may lead us in unexpected directions

E.g., understanding the growing geographic inequality in population health and how populations are able to use – or be constrained in using – their resources to garner health advantages