The Science of Population Health

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Population Health: a Movement
Population Health Science: a Foundation

<table>
<thead>
<tr>
<th>Neighborhood Disadvantage</th>
<th>Hypertension, WIV (ORs)</th>
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<tbody>
<tr>
<td></td>
<td>Bivariate</td>
</tr>
<tr>
<td>Adolescence (WI)</td>
<td>1.071**</td>
</tr>
<tr>
<td>Transition to adulthood (WIII)</td>
<td>1.018</td>
</tr>
<tr>
<td>Young adulthood (WIV)</td>
<td>1.051*</td>
</tr>
</tbody>
</table>

** p<.01; * p<.05

Examples of population health science borrowed from Harris, Presentation on Add Health at Columbia University, May 11 2015; and http://www.wonderbabiesco.org/SNA.php
Trends in Use of Population Health

• Hits for “Population Health” on Google:
  300 in 2001; ~99,200,000 on Nov 30
• Articles with Population Health listed as topic on Web of Science:
  40 in 1995, 736 in 2014
• Many schools, departments, centers, foundations, public health agencies adopting the term
A movement with a cause

http://www.lean.org/images/shook_hc_chart.gif
Death rates in 2008: **US vs. other countries**
All-cause mortality, ages 45–54 for US White non-Hispanics (USW), US Hispanics (USH), and six comparison countries

Case & Deaton, 2015
Movement causes:

- Declining returns to investment in medicine
- Need to re-balance health policy
A tangle of meanings?

- **Health care & health policy**: reduce costs in patient populations
- **Population health action**: upstream levers to improve health in local & national populations
- **Population health science**: produce knowledge about multi-level production of health in populations (broadly defined)
Population Health Science

• Interdisciplinary and multi-method
• Characterizes/explains population health levels & disparities
• Produces knowledge about:
  • multilevel (cells to society) causes of health and disease
  • mechanisms through which health and health disparities are produced
  • evidence base for policies and practices that improve population health and ameliorate health disparities

Multi-Level Model of Health
Adapted from Glass & McAtee 2006
Key Accomplishments

- “Fundamental causes”
- Tying “social exposures” to health and disease through stress, immune systems
- Unpacking health disparities
- Integrating life course perspectives
- Integrating genetics/biology into social science research
- Obesity and tobacco
- Building/clarifying empirical evidence for potential action
Example: The Work-Family-Health Network Project

- Multi-site, randomized, controlled trial of a workplace intervention
  - produce family supportive supervisory behaviors & improve employees’ control over when and where they work
  - two different sites: information technology professionals & service workers in long-term health care
- Multi-level approach, spanning business practices to biology
- Interdisciplinary team
- Multi-sectoral
- Basic & applied science

Thanks to Lisa Berkman and Roz King for information about this project.
Example: Adolescent Health and Development in Context

- Youth aged 11 to 17 years in Franklin County, Ohio.
- Advances “neighborhood effects” research which has largely neglected actual routine exposures to local settings
- Collects multi-method, multi-contextual data on youth:
  - Detailed, geo-coded data on the activity spaces of adolescents
  - Actual social exposures via Ecological Momentary Assessment (EMA)
  - Social network data
  - Biomeasure data to study stress & immune function

Thanks to Chris Browning, Ohio State U, for information about this project; graphic from http://jasss.soc.surrey.ac.uk/14/1/6/Activity_Space.jpg
How did we get here?
In 1994, social epidemiologist Nancy Krieger argued that public health, like biomedicine,

“emphasizes biological determinants of disease amenable to intervention through the health care system, considers social determinants of disease to be at best secondary (if not irrelevant), and views populations simply as the sum of individuals and population patterns of disease as simply reflective of individual cases” (1994, 892).
What Helped?

- Whitehall Studies (Marmot et al 1978): massive health disparities in a population with universal health care
- Social justice values drew attention to health disparities in US
- Within medicine, more (scattered) attention to social conditions
- Increasing attention to interdisciplinarity by funders
- More attention to contextual effects in sociology, education, development of multi-level modeling

But still many barriers that reflect the continuing power of cultural and institutional forces
We’re Not Home Yet...

- Dominance of medicine in US health enterprise continues
- Meaning of health slow to change
- Long-standing disciplinary structures on campuses and other aspects of academic life (associations, journals)

BUT...

- Concept of Population Health Science carves out space for change
Future Challenges for Population Health Science

• Mechanisms:
  • Better characterize mechanisms that link factors at different levels
  • E.g., unpacking effects of education, neighborhood effects
  • How determine which mechanisms matter most?

• Integrate social science theory that views the environment as a complex system with dynamics of its own

• A revolution in methods
  • Oakes, 2013: “a 5-year ban on social epidemiologic grant applications that rely on multiple regression models would greatly enhance our collective creativity and insights.”

• What kind of evidence can/should inform action?
  • Standards of inference, triangulating diff types of evidence
Challenging Opportunities

- Multiple-sector efforts to improve population health
  - Integrate research!
  - Bridge with health care

- Data, data, data
  - Environmental, administrative, social media, survey, medical ...
  - Opportunities for integration

- Research at/across different levels of aggregation
  - New models for community-based research?
  - Bridging strengths of national and local studies?
Institutional Supports?
Training in Interdisciplinary Population Health Science: A Vision for the Future
June 1-2, 2015

Hosted by the IOM Roundtable on Population Health Improvement and supported by the NIH OBSSR, NIMHD, the Roundtable, and RWJF Health & Society Scholars

Training in Interdisciplinary Health Science:
Current Successes and Future Needs
A paper commissioned by the Institute of Medicine Roundtable on Population Health Improvement
• Key Goals:
  • Advance population health science
  • Improve population health by promoting the communication and application of science
  • Support population health scientists in their careers

• Conferences funded by RWJF:
  • Building Bridges to Improve Population Health, Sept 19-20, 2015 National Academy of Sciences
  • Save the date: September 19-21, 2016 at Penn State University

• Final organization as membership association under development
• Join mailing list: info@ia4phs.org

Dedicated to improving the health of populations by advancing and communicating population health science.