What affects health?
Part I: Social determinants

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Major scientific advances shed light on the social determinants of health

- Large bodies of knowledge accumulated over multiple decades
- Advances in neuroscience indicate how social factors like income, education, stress, and racism “get into the body”
- Chronic stress is likely a major contributor to both socioeconomic and racial/ethnic disparities in health
- Childhood experiences shape adult health
- Understanding how racism damages health across generations
- Epigenetics: “Genes load the gun; the environment pulls the trigger” (J Stern, UC Davis)
How does income or wealth affect health?

It can shape:
• Medical care
• Nutrition & physical activity options
• Housing & neighborhood conditions
• Services

Which can affect:
• Stress
• Family stability

Parents’ income/wealth shapes offspring’s:
• Education
• Occupation
• Income/wealth
Income/wealth shape neighborhood options. Concentrated poverty creates unhealthy places.

- Pollution, crime
- No safe places to exercise
- Pervasive unhealthy food
- Ads for harmful substances
- Social networks & support
- Norms, role models, peers
- Poor quality schools → poor access to jobs → less income & wealth → financial hardship → stress, hopelessness
- Racism tracks Blacks into poorer neighborhoods than Whites of similar income

Image: Dan Loh/AP
The stress-health link is biologically plausible

- Neuroscience indicates how social factors like income, education, & racism-related stress can lead to chronic disease
- Responses to stress involve HPA axis (CRH, cortisol), autonomic nervous system (epinephrine, norepinephrine), immune/inflammatory mechanisms (cytokines, prostaglandins), telomeres...
- Chronic stress is a plausible major contributor to both the socioeconomic gradient and racial disparities in health

How could stress affect health? One example

DAMAGE TO MULTIPLE ORGANS & SYSTEMS → chronic disease, immune suppression, inflammation

Hypothalamus

CRH

Pituitary Gland

ACTH

Adrenal Glands

CORTISOL

STRESSOR

Source: Center on Social Disparities in Health, UCSF.
Childhood socioeconomic conditions shape adult health

- Chronic stress/deprivation in childhood $\rightarrow$ adult chronic disease
- Lasting effects of in utero/early childhood deprivation, e.g.,
  - Low SES in adulthood
  - Neuroendocrine and/or immune dysregulation
  - Not always erased by improved conditions later
- Cumulative effects of disadvantage
The legacy of (once-legal) discrimination: Lower income, wealth, education, and occupation

At a given income or educational level, Blacks and Latinos have:
- Less wealth
- Unhealthier neighborhoods
- More disadvantaged childhoods
- More hardship, fewer resources to cope

Rarely measured but studies often conclude a racial difference is genetic if it persists after "control for SES"
- Race often captures unmeasured socioeconomic factors
And direct psychological effects of racism-related stress

- Overt or subtle incidents
- Constant vigilance
- Chronic stress increases risk for chronic disease, e.g. via HPA axis/ANS activation → inflammation, immune dysregulation
- Racism → low SES, stress → health damage

Image: http://www.empowermagazine.com/how-racism-affects-your-health/
Education can shape health behaviors by determining knowledge and skills.
Other plausible pathways from education to health, e.g., via work & income

- Educational attainment
  - Work
    - Work-related resources
      - Income
        - Health insurance
        - Sick leave
        - Wellness programs
        - Stress
    - Working conditions
      - Hazardous exposures
        - Stress
  - Health
Psychosocial pathways from education to health

Educational attainment

Social networks

Control beliefs (powerlessness, sense of control, fatalism, mastery)

Social standing

Social & economic resources
Perceived status
Stress

Health

Social & economic resources
Norms
Social support
Stress

Response to stressors, coping
How could education affect health?

Educational attainment → Health knowledge, literacy, coping & problem solving

- Diet
  - Exercise
  - Smoking
  - Health/disease management

Educational attainment → Work

- Working conditions
- Work-related resources
- Income

- Exposure to hazards
  - Stress

- Health insurance
  - Sick leave
  - Stress

- Housing
  - Neighborhood environment
  - Diet & exercise options
  - Stress

Educational attainment → Control beliefs

- Coping & problem solving
  - Response to stressors
  - Health-related behaviors

- Social & economic resources
  - Perceived status
  - Stress

- Social & economic resources
  - Social Support
  - Norms for healthy behavior
  - Stress

HEALTH

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What produces health inequities across the life course and across generations?

SOCIETY

Social Context

Policy Context

Reducing social inequality

1. Social inequality

Reducing harmful exposures

2. Differential exposure

Reducing vulnerability

3. Differential vulnerability

Disease

Preventing unequal consequences

4. Differential consequences

Social consequences of ill health

5. More social inequality

Adapted from Diderichsen, U. Copenhagen
What to do in the face of the complexity? Give up?

- No!
- Reconsider what constitutes evidence worthy of action
  - Medicine/health: RCT results
  - Civil law: Preponderance of findings
  - Criminal law: Beyond a reasonable doubt
- But don’t abandon rigor
- Choose the strongest design for a given research question
- Studies that are multifactorial, multilevel, longitudinal, and consider interactions
Knowledge of general pathways is not enough. Test interventions

- A large body of evidence from credible scientific sources indicates a major role in influencing health for social factors such as income, wealth, poverty, education, early childhood, and stressful experiences.
- This evidence meets standard criteria for causal inferences at a general level.
- But it does not (often) reveal the effects of specific interventions with specific populations.

- Test interventions
  - Study natural experiments
  - More rigorous evaluation of programs
But does knowledge matter?

• Often necessary, rarely sufficient, depends on timeliness
• Researchers should collaborate with communities, advocates, policy makers and communications/policy experts in defining priority questions
• So much we do not know, but we know enough to act
  • And rigorously evaluate outcomes—long- and short-term
• Study how to create political will
• Largest barriers are political, not scientific
“Good news—I hear the paradigm is shifting.”