HEALTH DISPARITIES: WHO IS AT RISK AND HOW DOES RISK GET UNDER THE SKIN?

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SOCIAL CLASS Á LA GEORGE SEURAT

Bathers at Asnières, 1884

A Sunday on La Grande Jatte, 1884-86
OUTLINE

- WHO IS AT RISK?
  - Evidence for health inequalities
  - Psychological factors in the context of health inequalities

- HOW DOES RISK GET UNDER THE SKIN?
  - Changes in cardiovascular system during stress

- FUTURE RESEARCH DIRECTIONS

- TAKE HOME MESSAGES
WHO IS AT RISK?

U.S. Women only
Hummer & Hernandez, 2013, Population Reference Bureau
WHO IS AT RISK?

Braveman et al., 2010, Am J Pub Health

2004: MIDUS II survey. $N = 4,963$; 75% retention rate (mortality adjusted)

   Overnight clinic visit for biological data ($N = 1,255$)

   Daily stress, cognitive, and neuroscience projects

2013: MIDUS III survey. $N = 3,294$; 77% retention rate (mortality adjusted)

   Biological data collection ongoing

Radler & Ryff, 2010 and Love et al., 2010, *Journal of Aging and Health*
WHO IS AT RISK?

Interleukin-6 (IL-6): Marker of inflammation that contributes to development and progression of CVD, type 2 diabetes, cancer, Alzheimer’s

Source: MIDUS 2

Morozink, Friedman, Coe, & Ryff, 2010, *Health Psychol*
Not all low SES individuals have poor health

Can variation in psychological factors help us identify who may be vulnerable and who may be resilient?

Goal to examine anger as an aggravator and psychological well-being as a buffer of health inequalities
ANGER AND HEALTH

• Not a new idea!
• Seneca (1st century A.D. Roman philosopher):
  “This, rather, is what we ought to realize—how many men anger
  in and of itself has injured. Some through too much passion have
  burst their veins... and sickly people have fallen back into
  illnesses...”
  • Schimmel, 1979, p. 330
• Journal of the American Medical Association, 1896,
  “The Physiologic Effects of the Indulgence in Anger”
THE PHYSIOLOGIC EFFECTS OF THE INDULGENCE IN ANGER.

The *Medical Examiner* quotes from the *Journal of Hygiene* a vivid description of the results of bad temper. It says: We can readily understand the sentiment of the Latin line in our old copy-books, *Irae furor brevis est*, in the presence of this vivid portrayal.

The list of affections defined under “angina” in the dictionaries—for it has the same derivation as anger—and its modifications, as angina pectoris, is something startling, for it may be safely said that an uncontrollable, passionate disposition, individual or ancestral, is the seed from which most of these ugly conditions have sprung. Look for a moment at a man in a fierce rage: The muscles of his arms are tense, so that his fists are instantly clinched, the muscles of the neck and chest so rigid that breathing becomes difficult and unnatural, and the circulatory system is temporarily congested. When such a mental state is frequently allowed unnatural sway over the body, it is not hard to see how the difficult breathing and inflammatory states of the various diseases which are grouped under the head of angina, and the constricting pain and spasm of angina pectoris have their origin. It sometimes happens that a man falls dead in a fit of rage, and it is said, perhaps, that he had a weak heart, which could not stand the strain imposed by his mental state. Nobody seems to think that this is but the culmination of a long series of such fits of madness, which have themselves caused the weakness in question.

Another class of persons are slow to anger, but when aroused are so filled with resentment that they will brood over injury or injustice for months or years. They brood and brood over the occurrence until it becomes a mental canker, eating into the vitals, and this, if habitual in recurrence, will produce disastrous results.

Still another class are fault finders. Perhaps they are seldom positively angry, but their minds are in a chronic state of turbulence in which they feel themselves injured. These people suffer from nervous diseases.

People of this description are not first-class selected lives. They become so-called cranks—abnormal creatures, and sooner or later do something or become victims of some condition which will cut short their life expectation.

(JAMA. 1896;26:781-782)
ANGER AND CARDIOVASCULAR HEALTH

- Anger/hostility $\rightarrow$ high blood pressure, higher risk of CVD, inflammation

- Research on anger and health often ignores socioeconomic context!
EXPRESSING ANGER OUTWARDLY PREDICTS HIGH IL-6 FOR LESS EDUCATED ONLY

Boylan & Ryff, 2013, *Psychosomatic Medicine*
SUMMARY AND IMPLICATIONS

- Trait anger and outward anger expression associated with higher inflammation among less educated
- Anger-control associated with lower IL-6 among less educated women
- **Role of Age**
  - Older adults report less anger, more anger management
  - Older adults with high outward anger expression → higher risk for metabolic syndrome (Boylan & Ryff, 2015)
- Social context is critical for understanding anger—health linkages
HEDONIC AND EUDAIMONIC WELL-BEING

Bosch’s “Garden of Earthly Delights”

Raphael’s “School of Athens”
ILLUSTRATIVE WELL-BEING ITEMS

Hedonic well-being
Measured with Happiness, Life satisfaction
“How much of the time did you feel...cheerful?”...full of life?”
“Felt like I was having a lot of fun.”

Eudaimonic well-being
Measured with Ryff model of Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, Self-Acceptance
ILLUSTRATIVE WELL-BEING ITEMS

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Measured with Happiness, Life satisfaction
“How much of the time did you feel...cheerful?”...full of life?”
“Felt like I was having a lot of fun.”

Eudaimonic well-being
“For me, life has been a continuous process of learning, changing, and growth.”
“Most people see me as loving and affectionate.”
“I am quite good at managing the many responsibilities of my daily life.”
WELL-BEING AND HEALTH

- Higher well-being → lower morbidity and mortality
  → fewer cardiovascular events
  → lower all-cause mortality
  → better physical functioning
  → lower risk of incident Alzheimer’s disease

- Higher well-being → intermediate biological pathways
  → lower risk of metabolic syndrome
  → lower inflammation (e.g., IL-6)
  → better lipid profiles
HIGH PSYCHOLOGICAL WELL-BEING PROTECTS AGAINST HIGH IL-6 AMONG LESS EDUCATED

Morozink et al., 2010
SIMILAR PATTERNS FOR POSITIVE AFFECT, ENVIRONMENTAL MASTERY, SELF-ACCEPTANCE, AND POSITIVE RELATIONS WITH OTHERS

[Graphs showing data for Serum IL-6 (pg/mL) across different levels of education for various metrics: Positive Affect, Environmental Mastery, Self-Acceptance, Positive Relations with Others, Purpose in Life.]
SUMMARY AND IMPLICATIONS

- Well-being → lower inflammation among less educated
- Will teaching anger management or promoting well-being confer physical health benefits, especially for socioeconomically disadvantaged?
- These models help identify who is vulnerable and resilient, but do not consider biological and behavioral pathways from SES to health
Methodological Integration

- Population-based studies to understand SES → biological risk
- Laboratory-based studies to examine real-time cardiovascular reactivity and recovery to acute stress
CARDIOVASCULAR STRESS RESPONSE

- Using tools from psychophysiology, we can measure cardiovascular responses to stress in real time
  - Blood pressure
  - Electrocardiogram (ECG)
  - Impedance cardiography

Blascovich et al., 2011. Fig. 2.4
STRESS REACTIVITY AND RECOVERY

From Schaefer, Boylan et al., 2013, Plos ONE

Reactivity (Davidson, 2004; Kemeny & Dickerson, 2008; McEwen, 1998)
STRESS RESPONSES ➔ DISEASE

- Exaggerated cardiovascular responses to stress ➔ subclinical disease, morbidity, mortality (Chida & Steptoe, 2010)
- Poor recovery from acute stress ➔ unhealthy changes in cardiovascular functioning, cardiovascular disease, all-cause mortality (Panaite et al., 2015)

Research questions: Are there differences in cardiovascular reactivity and recovery to stress in adulthood (age 32) as a function of childhood SES (ages 6-16)? Does well-being change relationship?
CHILDHOOD SES AND CARDIOVASCULAR STRESS RESPONSE

- Sample: follow-up from Pittsburgh Youth Study
  - 246 study participants
  - 100% male; 55% African American
  - Mean age = 32 years (range: 30-34 years)

- No associations between childhood SES and cardiovascular measures at baseline or reactivity to stress

- Lower childhood SES ➔ higher systolic blood pressure and heart rate at recovery

Boylan, Jennings, & Matthews, 2016, Health Psychol
PSYCHOLOGICAL WELL-BEING PROTECTS AGAINST HIGH SBP DURING RECOVERY AMONG LOW SES

Boylan et al., 2016, Health Psychol
DOES SES RELATE TO CARDIOVASCULAR RESPONSES TO STRESS?

- Systematic review and meta-analysis
- 25 studies (n = 14,617) have assessed SES and cardiovascular reactivity → No reliable association
- 6 studies (n=1,324) have assessed SES and cardiovascular recovery → Higher SES have better recovery

Boylan, Cundiff, Matthews, 2018
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Boylan, Cundiff, Matthews, 2018
SUMMARY AND IMPLICATIONS

- Cardiovascular system, specifically as it recovers from stress, may be a key biological pathway underlying inequalities in health

- Protective role for psychological well-being
FUTURE RESEARCH DIRECTIONS

Laboratory approach:
• Acutely increasing the salience of well-being and testing changes in cardiovascular system during stress reactivity and recovery.
• Direct test of stress reactivity and recovery as mechanism of well-being
• Key question: are effects stronger among low SES?

Leonardo da Vinci.
FUTURE RESEARCH DIRECTIONS

Broader Economic Factors approach:

• Socioeconomic environment of your neighborhood is more important for the cardiovascular health of low SES individuals

• Has the Great Recession (2007-2009) increased inequalities in cardiovascular health?

Ludwig Meidner, 1913
“Burning City”
TAKE HOME MESSAGES

- Pronounced SES gradients in many health outcomes and biological risk factors at midlife and old age

- Anger may *exacerbate* and psychological well-being may *mitigate* inequalities in health

- Importance of recovery from stress in understanding how risk from inequalities gets under the skin to affect physical health
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