The Social Symbiome Framework: Linking Genes-to-Global Cultures in Public Health Using Network Science

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Introduction: Linking Biology and Society

- Human Genome Project
- Obsolescence of Nature-Nurture Debate
- Transdisciplinarity
The Network Episode Model

- Individuals as pragmatic and social
- Explicitly dynamic and event-based
- Focus on the episode, not the choice
- Focus on pathway (choice, coercion, “muddling”)
- Interaction in social networks as underlying mechanism

Sources:


### Finding #1: Pathways to Care

<table>
<thead>
<tr>
<th>Story Theme</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice</td>
<td>50</td>
<td>45.9</td>
</tr>
<tr>
<td>Coercion</td>
<td>25</td>
<td>22.9</td>
</tr>
<tr>
<td>“Muddling through”</td>
<td>34</td>
<td>31.2</td>
</tr>
</tbody>
</table>

Finding #2: Social Networks Shape Pathways to Care, But Not in Isolation to Biological Systems

- Social networks interact with type of symptom to shape pathway to care

- Larger social networks are more potent for individuals with bipolar disorder
  - Significantly associated with a coercive pathway to the mental health system
Finding #4 & #5: Network Effects in Historical Context

- Geographical context delimits the ability of religions to form a “community of support”

- Religious “hubs”
  - **Judaism**: Overall protective effect but “small”
    - Large effect in Northeast; reversed in South
  - **Catholicism**: Overall protective effect is “solid”
    - Similar reversal in the South
  - **Evangelical Protestantism**: Some protective effects
    - Reverse in Northeast

Finding #5: Support Groups, PTSD and Outcomes for Veterans

- Social interaction with network of other Vietnam vets reduces stress reaction in cosmopolitan metro areas but increases it in medium size cities and rural areas.

- Because combat is exogenous to current setting, not “drift” or “selection” confound.

Illustrating the Fundamental Dilemma

Example: Religion and Suicide

The Contextual Level (Social/Behavioral Science)

Problems of: Ecological Fallacy

The Individual Level (Biological/Medical Science-BMS)

Problems of: Generalizability

Transdisciplinary Agenda: The Individual in Context

Source: Adapted from: Social Networks and Health, Levy and Pescosolido, 2002
Multi-level approach (individual, personal network, treatment organizations, service systems)

Sources:


9/15/2012
No Shortage of Conceptualizations


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9/15/2012

Pescosolido, page 10
Requirements for Connecting Models

- Consider and articulate the full set of contextual levels that have a documented role in past empirical research.
- Offer an underlying mechanism or “engine of action” that connects levels, is dynamic, and allows for a way to narrow down focal research questions (NRC 2006, IOM 2006).
- Employ a metaphor and analytic language familiar to both social and natural science that can facilitate synergy.
- Understand the need for and use the full range of methodological tools proven useful in the social and natural sciences.
- Provide a tangible way to intervene from treatment to activism to policy.

One Key: Social Network Perspective or Networks & Complex Science

- Complexity theory → large-scale, *interacting units*
- Relationships are “fundamental mediators of human adaptations”
- Networks are the “active ingredients of environmental influences” — *Neurons to Neighborhoods*
- Puts human face on issues of access, barriers, intervention, and points of direct intervention by conceptualizing these as actions of individuals
- Introduces a way to connect to “the rest”
Tripartite Base and Goal

- Biological foundations
- Biological Embedding
  - Hertzman 1999
- Social embeddedness
  - Granovetter 1985

Simmel 1922: “…society arises from the individual and the individual arises out of association.”
The Social Symbiome

- It is the convergence or clash among network systems that drives the onset and response to problems such as suicide, mental illness, and substance abuse.

- Health, health behavior, illness behavior, and health care outcomes are shaped by six systems:
  - Three individual / internal systems embedded in three external systems.
  - These shape the dynamic health, illness, and treatment and recovery careers of individuals.

The Social Symbiome

Community
Organizations
Personal Networks
Life Course
Individuals
Organ Systems
Molecular

Global / Local / Virtual
Civic Organization
Social Service System
Treatment Systems
Friends, Kin
Health & Human Development
Identity
Social Location
Connectome
Genome
Epigenome

9/15/2012

Pescosolido, page 16
The Bottom Layers?

*The Connectome at Multiple Scales:* These scales can be roughly categorized as microscale, mesoscale, and macroscale...any unified map will likely rely on “probabilistic” representations of connectivity data.


Finding #8: Network Ties Change Genetic Effects

Network-Episode Model – Phase I

- Health care utilization
- Dynamic “illness career”, “patterns” & “pathways”
- Rational choice subsumed as one option in a social influence process

Sources:
Elaboration of dynamics of treatment, organizational, and policy choice

“Outside,” “Inside” Network

Sources:

Finding #2: Community Ties Shape The Response to Mental Illness
