Social Networks and Health

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Social Network Model

Source: Bolssevain, Jeremy: Friends of Friends, 1974
Conceptual Model of How Social Networks Impact Health

**Upstream Factors**

Condition: the extent, shape, and nature of...

Which provides opportunities for...

Which impacts health through the following...

**Social-Structural Conditions (Macro)**
- Culture
  - Language
  - Norms and values
  - Competition/cooperation

- Socioeconomic Factors
  - Inequality
  - Discrimination
  - Conflict
  - Labor Market structures

- Sociogeographic Factors
  - Urban/rural
  - Neighborhood characteristics
  - Residential and occupational segregation

- Social Change
  - Urbanization
  - War/civil unrest
  - Economic depression

**Social Networks (Mezzo)**
- Network Structure
  - Size
  - Density
  - Reciprocity
  - Reachability
  - Proximity
  - Organizational structure
  - Social ranking

- Network Activation
  - Frequency of face-to-face interaction
  - Frequency of nonvisual contact
  - Frequency of organizational participation (attendance)
  - Duration and intensity of...

**Behavioral Mechanisms (Micro)**
- Social Support/conflict
  - Instrumental and financial
  - Informational Appraisal
  - Emotional
  - Conflict/negative

- Access to Resources and Material Goods
  - Jobs/economic opportunity
  - Access to health care
  - Housing
  - Human capital
  - Referrals/institutional contacts

- Social Engagement
  - Physical/cognitive exercise
  - Reinforcement of meaningful social roles
  - Interpersonal attachment

- Social Influence
  - Constraining/enabling influences on health behaviors
  - Attitudes and norms toward help-seeking
  - Attitudes and norms toward treatment adherence

**Pathways**
- Psychobiological Pathways
  - Stress-response/allostatic lode
  - Immune system function
  - DHEA levels
  - Glucocorticoid levels
  - Blood pressure
  - Cardiovascular reactivity
  - Inflammation

- Health Behavioral Pathways
  - Smoking/alcohol consumption
  - Diet
  - Exercise
  - Adherence to medical treatments
  - Help-seeking behavior

- Psychosocial Pathways
  - Self-efficacy
  - Coping effectiveness
  - Relaxation/stress management
  - Depression/distress
  - Sense of well-being/QOL
The upside of social integration, social support: experimentally induced support or disease exposure
Pittsburgh Common Cold Study N=276:
Cohen et al. JAMA, 1997

VIRUS

6 Day Quarantine

Social Roles

Clinical Colds
Social Roles and Colds
Cohen et al JAMA, 1997

(Odds ratios are adjusted for control variables.)

![Bar chart showing the relationship between high-contact roles and colds]

- OR = 4.23 * for 1 to 3 high-contact roles
- OR = 1.87 * for 4 to 5 high-contact roles
- OR = 1.00 for 6 or more high-contact roles
Social Support and Blood Pressure Reactivity to Challenge: experimentally induced blood pressure reactivity
Social Networks and Health: results from observational studies
Social integration and mortality in a French occupational cohort: EDF-GDF employees

Adjusted for age, occupational grade, cigarette smoking, alcohol consumption, BMI, depressive symptoms, self-rated health, and geographical region.
Survival curves by marital status and presence of close confidant

Williams et al., JAMA 1992
6-Month Mortality post MI by Emotional Support: EPESE

![Relative Risk Chart]

- 0 Sources: 53% (n = 53)
- 1 Source: 36% (n = 111)
- 2 or More Sources: 23% (n = 26)

*P ≤ .05.

Caregiving: the upside and downside
Caregiving in the Nurses Health Study.


- 54,412 women in the Nurses Health Study, ages 46-71 (no documented CHD)
- Information on caregiving in 1992
- CHD follow up 1992-1996
- 321 incident cases, 231 nonfatal, 90 fatal
CHD Risk: Caregivers of Disabled/Ill Spouse

Hours of Caregiving Per Week:
- 0
- 1-8
- >=9

<table>
<thead>
<tr>
<th>Total CHD</th>
<th>Nonfatal CHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>297</td>
<td>214</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
</tbody>
</table>
Mounting evidence that caregiving takes a toll

- Schulz and Beach. Caregiving strain increases mortality risk (RR=1.63)
- Caregivers have poorer immune function, slower at wound healing (Kiecolt-Glaser et al)
- Caring for disabled child, telomere length and telemere (Epel, Blackburn et al)
- Caring for cognitively ill is especially stressful (EPESE)
Social integration predicts the preservation of memory in US elderly: Findings from the Health and Retirement Study

Karen A. Ertel
M. Maria Glymour
Lisa F. Berkman
Methods: Study Sample

• Health and Retirement Study (HRS)
• Nationally-representative sample of US residents born before 1948
• 4 waves of data collection:
• N=16,638
Methods: Exposure Measure

- Social integration at baseline (1998)
  1. Marital status
  2. Volunteer activities
  3. Contact with parents
  4. Contact with children
  5. Contact with neighbors

Possible scores: 0, 1, 2, 3, 4, 5
Results: Trajectory of memory scores comparing subjects with high versus low social integration

Predictions are for white males with mean age, income, wealth, and education, and healthiest baseline scores for all health measures.
<table>
<thead>
<tr>
<th>TASK</th>
<th>THEORETICAL CONSTRUCT(S)</th>
<th>SAMPLE ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word List Recall (immediate and delayed)</td>
<td>Episodic verbal memory</td>
<td>15 words (e.g., flower, truck, school)</td>
</tr>
<tr>
<td>Backward Digit Span</td>
<td>Working memory</td>
<td>Spans from 2 to 8 (e.g., 7, 2, 5, 3 = 3, 5, 2, 7)</td>
</tr>
<tr>
<td>Category Verbal Fluency</td>
<td>Executive function, semantic memory</td>
<td>List as many animals as possible in 60 seconds</td>
</tr>
<tr>
<td>Number Series</td>
<td>Inductive reasoning</td>
<td>5 series of 5 numbers (e.g., 35, 30, 25, 20, 15… correct answer = 10)</td>
</tr>
<tr>
<td>Backwards Counting</td>
<td>Processing speed</td>
<td>Counting backward quickly from 100</td>
</tr>
<tr>
<td>Attention-Switching, Stop and Go Task Switch</td>
<td>Reaction time, attention, task switching</td>
<td>Normal condition: Green = Go; Red = Stop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reverse condition: Green = Stop; Red = Go</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With mixed and switched trials</td>
</tr>
</tbody>
</table>

MIDUS Brief Test of Adult Cognition by Telephone (BTACT) (Lachman & Tun, 2008)
Executive Function & Social Conflict [avg. M1&M2] Age stratified

Means

32-44 (p=0.08)  45-54 (p=0.02)  55-64 (p=0.03)  65-74 (p=0.32)  75+ (p=0.13)

* p = 0.05
*** p = 0.001
Can we intervene to promote health by improving social networks and social support?
ENRICHED—Enhancing Recovery in coronary heart disease: Objective


- To test the hypothesis that treatment of depression and low social support early after an acute myocardial infarction will reduce death and nonfatal recurrent infarctions.
Study Design  

- Randomized, parallel-group clinical trial to compare the efficacy of a psychosocial intervention vs. usual care
- 2,481 post-MI patients with depression or low social support
- Average 3.4 years of follow-up
- Blinded ascertainment of primary endpoint
- Intention to treat analysis
Baseline to 6-month Changes in Social Support and Depression

- ESSI reported for patients with low social support only
- Hamilton depression score reported for depressed patients only

Intervention effect
p<0.001

ESSI
Hamilton depression score

Intervention effect
p<0.001

Intervention

ESSI reported for patients with low social support only
Hamilton depression score reported for depressed patients only
Baseline to 6-month Changes in Social Support and Depression

ESSI score

Intervention: 5.1
Usual care: 3.4

Hamilton depression score

Intervention: -10.1
Usual care: -8.4

Intervention effect: p<0.001

ESSI reported for patients with low social support only
Hamilton depression score reported for depressed patients only