The Spread of Alcohol Consumption Behavior in a Large Social Network

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Presented by Fernando Gutierrez
Motivation

- 2002 study in U.S.
  - 55% adults had at least one drink in the last month
  - 62% of the men and 48% of the women

- Third lifestyle-related cause of death

- Other health-related phenomena propagate through social networks
Data Came From...

- Framingham Heart Study (FHS)
  - Study started 1948
- Individuals:
  - Participants (5124)
    - Offspring cohort
  - Contacts
    - Offspring cohort & Original cohort
- Data collected every 2 to 4 years
  - Lab test, physical test, questionnaire, etc.
Questions...

1) Presence of clusters of heavy drinkers and abstainers
2) Consumption behavior is associated with the person's contacts
3) Type of association have effects
4) Gender affects the spread of alcohol consumption
Measurements

- Participants self reported their alcohol consumption
  - Valid and reliable
  - Bias from participants
- Heavy drinker
  - Man: 2 drinks per day
  - Woman: 1 drinks per day
- Average number of drinks per day
- Not clinical definition of alcohol abuse
## Measurements

<table>
<thead>
<tr>
<th>Examination</th>
<th>Midpoint Year of Examination</th>
<th>Age, y*</th>
<th>Drinks per Day, n</th>
<th>Abstainers, %</th>
<th>Heavy Drinkers, %†</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1972</td>
<td>46.8</td>
<td>1.04</td>
<td>18.7</td>
<td>22.2</td>
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</table>
Consumption behavior associated with social network ties

- Cluster of people and consumption behavior
- 1000 simulated network with same topology
- Incidence of drinking is randomly distributed

\[ P_O(C_H|P_H) > P_R(C_H|P_H) \]
Data Analysis

Determinants in clustering of alcohol consumption behavior

- Explanation of nonrandom clustering
  - Homophily
  - Confounding
  - Induction

- Logistic Regression

\[ \text{status}_{t+1} = f(\text{age}, \text{sex}, \text{education}, \ldots, \text{status}_t, \text{contact}\_\text{status}_t, \text{contact}\_\text{status}_{t+1}) \]

- Contact status at t+1
Results

- Correlation between principal and contacts behavior
  - Principal drinks heavy if contacts drinks heavy
    - 50% with degree separation 1
    - 36% with degree separation 2
    - 15% with degree separation 3
  - Person abstains if other abstain
    - 29% with degree separation 1
    - 21% with degree separation 2
    - 5% with degree separation 3
Results: Social vs Geographical

Examination

- Relative increase in probability that principal drinks heavily given contact drinks heavily, %

- Examination
- Contact Social Distance
- Contact Geographic Distance

- Relative increase in probability that principal abstains given contact abstains, %

- Contact Social Distance
- Contact Geographic Distance
Results: Contact Effects

- Decline in effect with increase in social distance
- No decline in effect with increase in geographical distance
- Contact's consumption behavior affects principal's consumption behavior
- Additional contact affects principal's behavior
  - 18% heavy drinker → heavy drinker
  - 22% abstainer → abstainer
Results: Contact Effects

![Graphs showing the relationship between contacts and drinks per day.](image-url)
Results: Contact Type

- Sex affects how heavy alcohol consumption spreads
  - Friends
  - Spouses
- Similar results for abstention
Results: Contact Type - Drinkers

Graph showing the increase in probability that principal drinks heavily if contact drinks heavily, in percentage, for different contact types.
Results: Contact Type - Abstains
Discussion

- Alcohol consumption behavior is correlated with the social network
- Correspondence with previous studies
  - Difference in patterns
- Social network has positive and negative effects
Clustering Explanation Revisit

- Directionality of friendship is important
- Neighbors or geographical distance affect the consumption behavior
- Principal previous drinking status
- Contact's previous drinking status
Limitations of the Study

- Measure is not a clinic tool
- Can not estimate the relative negative effect of alcohol
- Sample is homogenous ethnically, but not socioeconomically
- Network ties were observed in the data set
Conclusion

- Correlation between consumption behavior and social network
- Positive and negative effects
- Spread is affected sex and friendship