Network Analysis
Why Measuring Connections Matter

Interdisciplinary Methods Core
Center for Interdisciplinary Research on AIDS
The Importance of Networks in HIV
The Importance of Networks in HIV

Small Change, Big Effects

Modest variations in the concurrency rate—the proportion of people in overlapping sexual partnerships—can have a dramatic effect on a population’s vulnerability to HIV.

When the concurrency rate is 55%, only 2% of this population is connected to the broader sexual network required for HIV transmission (top). But when concurrency reaches 65%, an astonishing 64% of the population is vulnerable, even though the number of sexual partners remains constant.

Social Networks and Behavior Change

Texting Connections by Problem Substance Use Group

- No Problematic Substance Use
- Problem Alcohol Use
- Problem Drug Use
- Problem Alcohol & Drug Use
Texting about Drug Use and Marijuana Use

- Individuals who sent more texts with marijuana related content were more likely to have:
  - positive attitudes toward marijuana use
  - more frequent marijuana use
  - problem marijuana use
- Those with problem marijuana use had significantly:
  - Lower betweenness centrality (15.5 vs. 42.2)
Extending the Understanding of Network Analysis to Research Networks
Connected HIV Care and Prevention: Research, Policy, and Action
Network Measures

• Size

• Centrality
  – Network: Whether network is formed around a few central members
  – Individual: # of total connections (indegree, outdegree)
Network Measures

• Cohesion
  – Network: Average closeness or Liking ratings

• Density
  – Proportion of all possible ties in a network
Network Measures

• Cliques
  – Subgroups in a network
An Example: The Criminalization Working Group

- To quantify relationships within and among members of the Criminalization Working Group, the IRM core created a network graph using the *digraph* package in R statistical software*

- In this graph each CWG member is a node and the ties represent both peer reviewed publications and collaboration on grant development

Network Representation of CWG Collaboration 2014
Benefits of Network Analysis

• Visualization makes working structure accessible

• Can identify individuals with high importance in terms of contributions to the collaboration

• Can identify what attributes of individuals and the network are needed for successful collaborations

• Ideal for monitoring of research and implementation, easily identifies where collaboration should be strengthened

• Can be continually updated within the igraph software to produce longitudinal networks as new collaborations are formed
Network Over Time

2014

2016
Assessment of Connections in This Room

- Developed Research Area
- Grant Submitted
- Grant Funded
- Manuscript Submitted
- Manuscript Published
- Other Collaboration