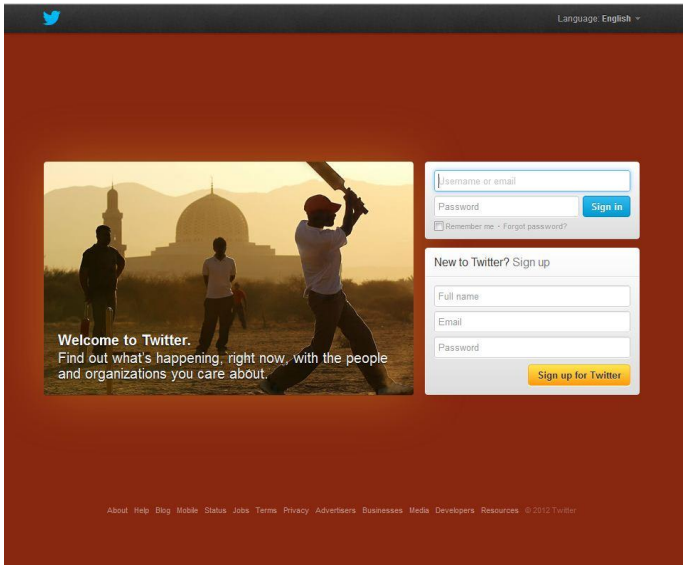
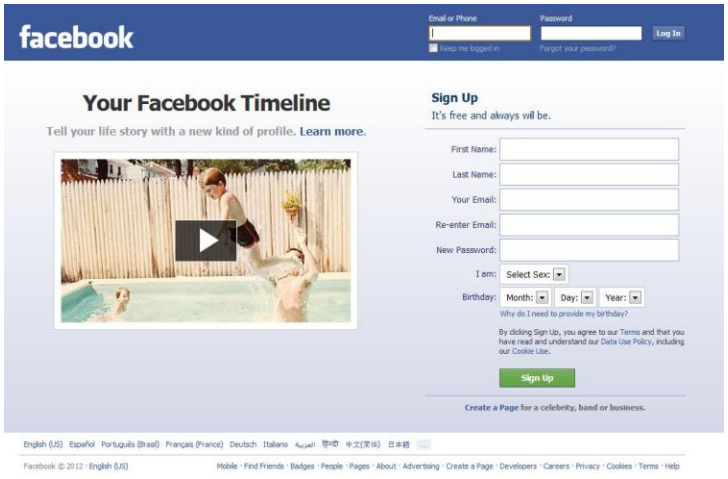
Social Network Analysis in Nursing Research

Anne L. Ersig, PhD, RN
Lioness Ayres, PhD, RN
Anthony Paik, PhD
University of Iowa

The University of Iowa
College of Nursing

Social Networks – Common Understanding

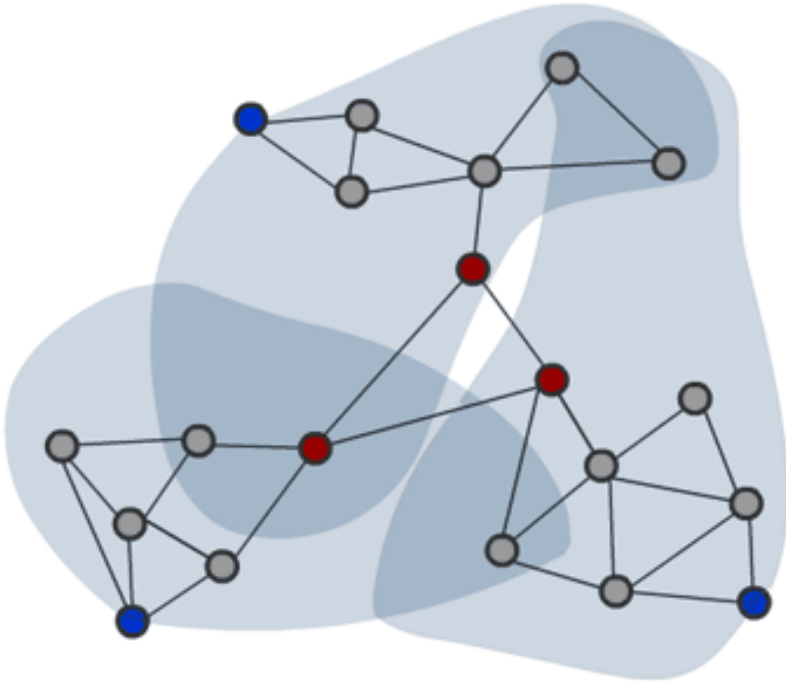




The University of Iowa
College of Nursing

Social Network Analysis

- A set of elements and the links among them
- Complexity science
- Focus on *relational* variables
- Assumptions
  - Interactions and context are important
  - Structure matters



Social Network Analysis

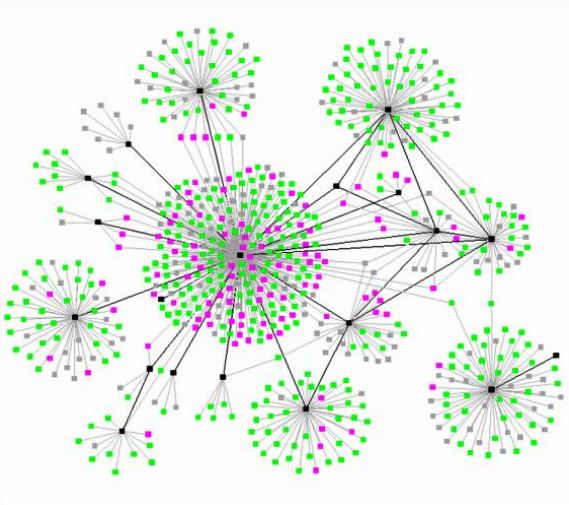
- Nodes / Actors
  - People
  - Nursing units
  - Organizations
- Links
  - Communication
  - Medication reconciliation
  - Transfer of information, goods or services

Social Network Analysis

- Data
  - Descriptive
  - Associations with other variables of interest
  - Structural
- Examples
  - *Antecedents* to relationships
    - What will lead to a particular tie?
    - What determines the structure of a network?
  - *Consequences* of relationships
    - What do the ties predict will happen?

Social Network Analysis

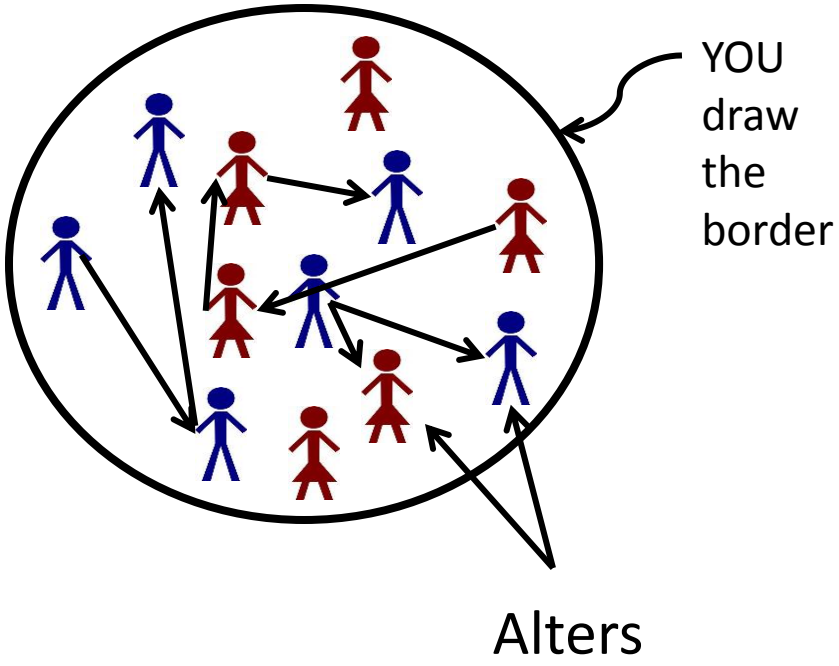
- Key Differences from Traditional Research
  - Relational approach
    - Unit of analysis is typically a *pair*
  - Study design
  - Data collection & analysis
- Study purpose and research questions dictate
  - Actors
  - Links
  - Type of network
  - Statistical analyses



Types of Networks

Complete Network

- All members within preset boundaries are included
- Links of interest are examined
- Members of network are called alters
- Networks that are pre-defined by an existing boundary



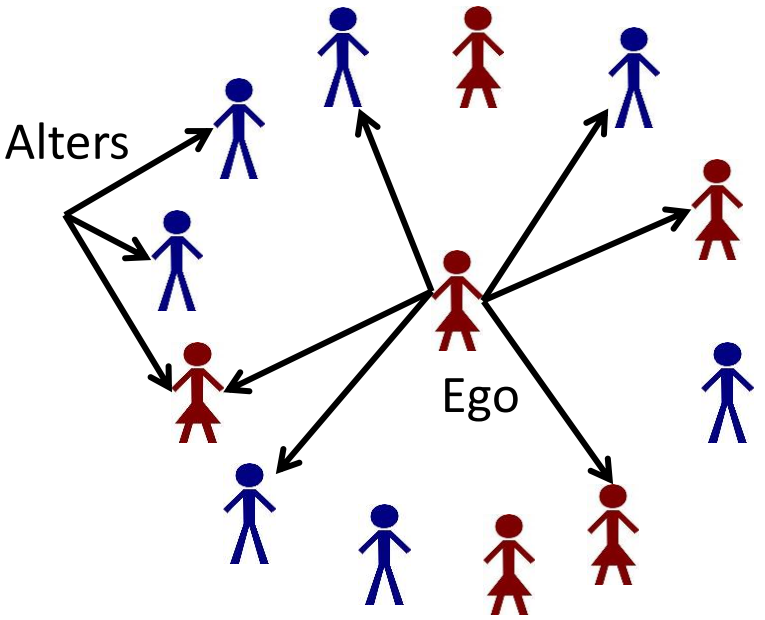
Complete Network Study Recruitment

- Maximize participation
- Strategies
  - Gain cooperation for group as a whole
  - Gatekeepers
  - Influential group members
  - Individual contact

Types of Networks

Ego-Centered Network

- Respondents of interest list members of their personal networks
- Questions about to whom they have particular links
- People you talk to are called egos
  - Their network members are called alters



Ego-Centered Network Study Recruitment

- Identify respondents of interest
- Network of interest defined by researcher
- Boundary of network defined by ego
- Recruitment Challenges
  - Identification of egos with particular characteristics
    - Hidden populations
    - Confidentiality
  - Institutional Review Board concerns
    - Identification of egos
    - Alters have not consented to participate
    - Respondents provide information about others

Defining the Network of Interest

- Network Generator
  - Question that prompts egos to list members of the network of interest
- Different network generators lead to different networks
  - Who do you think of as family?
  - Who contributes to your organization?

Defining the Links of Interest

- Research questions guide selection of links
- Links provide data for analysis
- Examples
  - Communication
  - Social support
  - Donations

Social Network Data Analysis

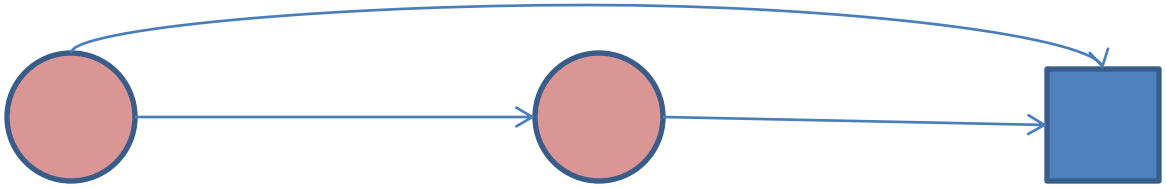
- Describe and compare
  - Characteristics of the network
    - Proportion of network members who are biological vs. social kin
  - Characteristics of network members
    - Length of employment
  - Characteristics of relationships
    - How does information flow in the network?

Social Network Data Analysis

- Examine social network structure
  - Are there friendship cliques in the classrooms of children who have mobility impairment?
  - Who are the important people in the network?

Social Network Data Analysis

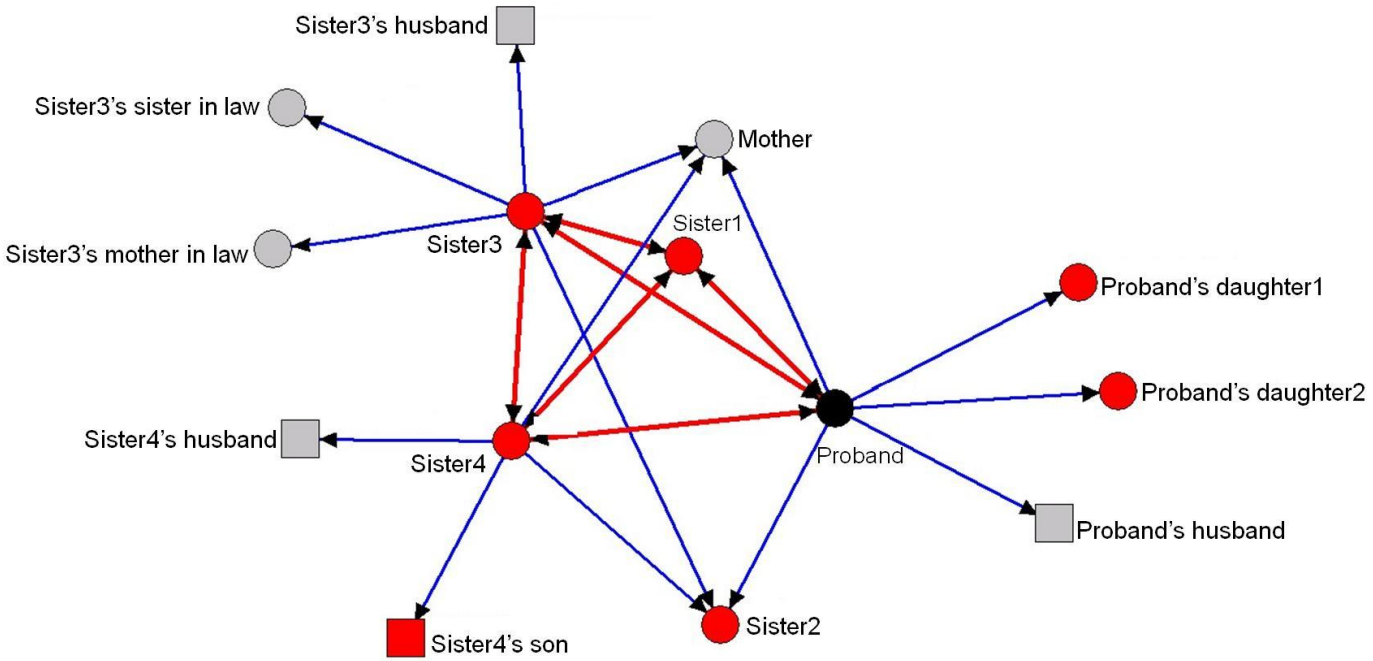
- Examine determinants of ties among network members
  - Are children with mobility impairment more likely to develop a tie to friends of friends?



  - Do attributes of the participants (age or gender) predict ties?

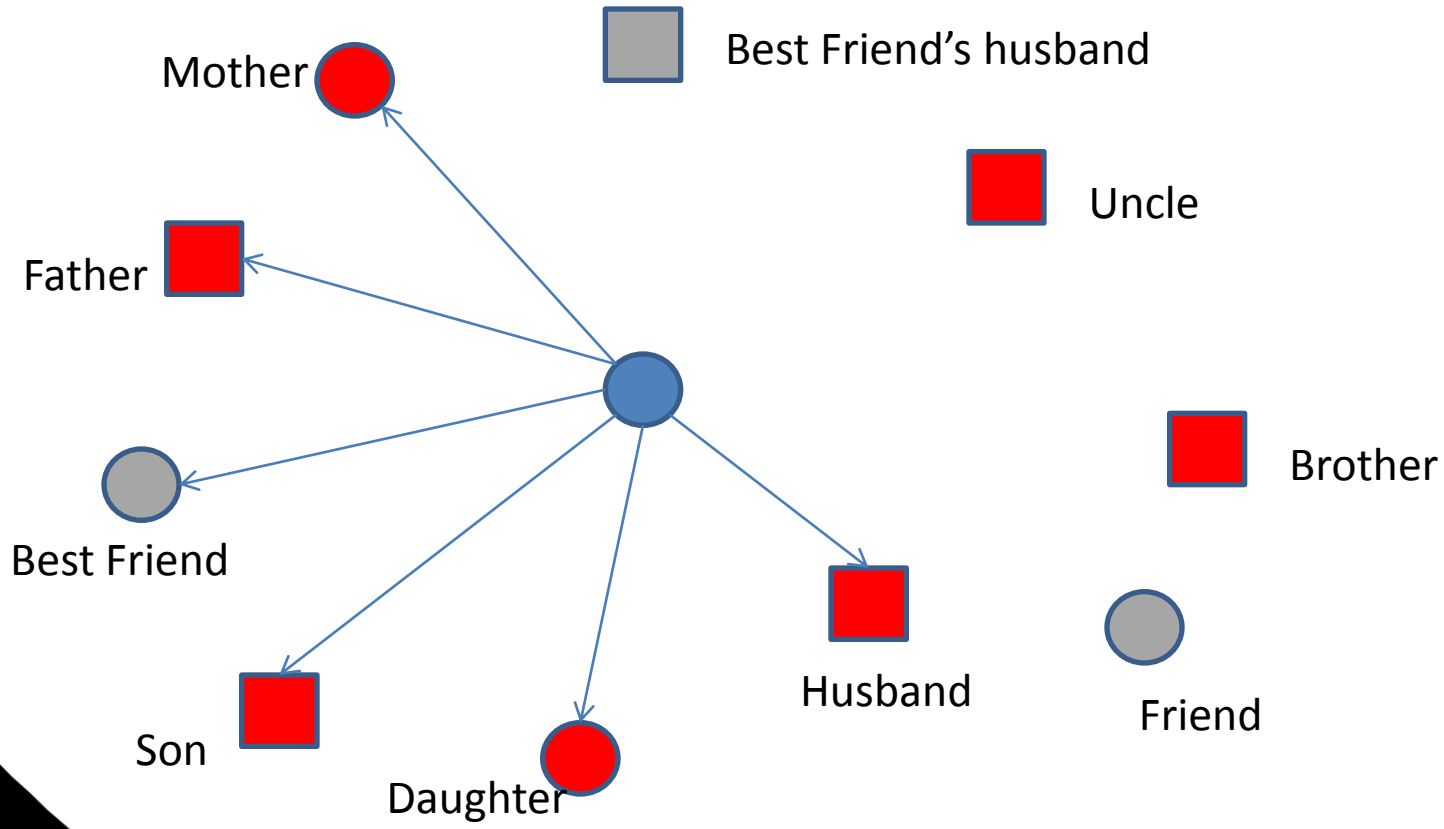
Social Network Data Analysis

- Account for interdependence among network members



Social Network Data Analysis

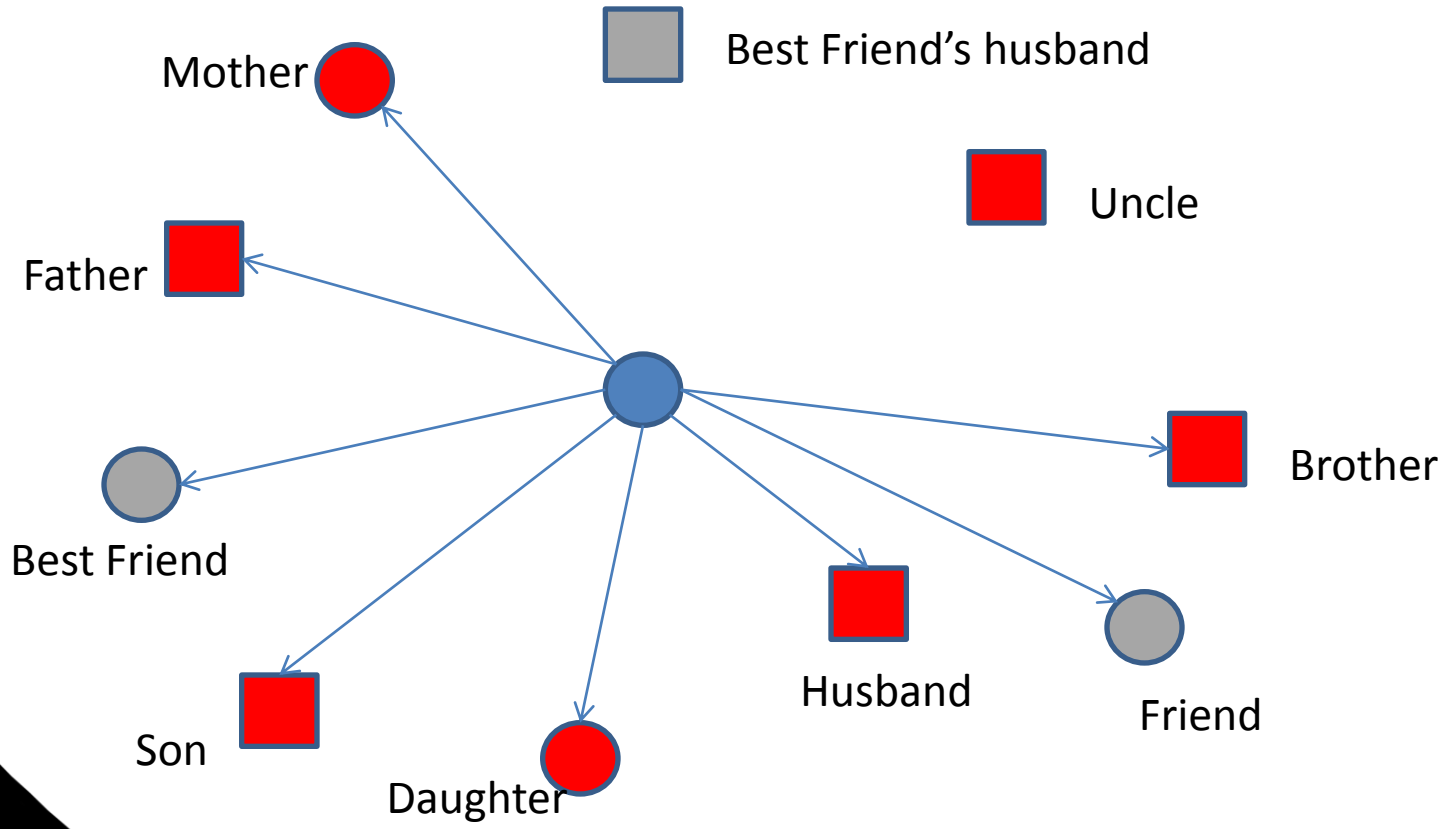
- Examine change over time



Time 1: Who have you talked to about your diagnosis?

Social Network Data Analysis

- Examine change over time



Time 2: Who have you talked to about your diagnosis?

Social Network Data Analysis

- Examine associations among individual level and relational data
  - Is type of relationship between an ego and alter associated with communication about a cancer diagnosis?
- Examine associations among relational data and outcomes of interest
  - Is communication about cancer associated with participation in cancer screening?

Social Network Analysis in Health-Related Research

- Individual and family response to health information
- Diffusion of innovations
- Within organizations
- Epidemiology

Individual and Family Response to Health Information

- Outcome variables
  - Colonoscopy screening (individual)
  - Patterns of communication (relational)
- Independent variables
  - Type of relationship
  - Gender
  - Age

Ersig et al, 2009, *Genetics in Medicine*; Ersig et al, 2011, *Health Communication*

Individual and Family Response to Health Information

- Social Network Structure
  - Number & proportion of network members involved in communication about a diagnosis
- Social network composition
  - Number and proportion of network members who are biological relatives
- Associations between independent and dependent variables
  - Is type of relationship associated with communication about a diagnosis?

Ersig et al, 2009, *Genetics in Medicine*; Ersig et al, 2011, *Health Communication*

Diffusion of Innovations

- Implementation of evidence-based practice
  - Where do practitioners get information on an evidence-based practice?
  - Who is implementing the evidence-based practice in their clinics?
- Examining diffusion of innovations
  - Change over time
  - Identify people central to diffusion and implementation

Within Organizations

- Multidisciplinary care team function in the ICU
- Identified care team members and key family member
  - Frequency of interaction
- Differences in team structure
  - Team 1 – Long-Term Patient
    - Attending physician central to team interactions
  - Team 2 – Recent Admission
    - Bedside nurse central to team interactions

Lurie et al 2009

Epidemiology

- Tuberculosis outbreak
- Social Network Analysis
  - Who was affected?
  - Which network members were exposed?
  - Where had the cases been?
- Genomic analysis of TB strains
- Identification of index cases

Gardy et al 2011

Conclusions

- Much of what we know about the world is relational
- Useful for studying different types of data
- Respondents embedded in their social context
  - Understanding respondents' worldviews
  - Intervention development
- Collaboration with a social network researcher

Resources

- International Network for Social Network Analysis: http://www.insna.org
- Books:
  - Wasserman & Faust (1994) – Classic, but very in-depth
  - Scott – Social Network Analysis: A handbook (2000)
  - Degenne & Forse – Introducing Social Networks (1999)
  - Knoke & Yang – Social Network Analysis (2008) – part of Sage Quantitative Applications in the Social Sciences

References

- Ersig et al (2009) Genetics in Medicine, 11:10, 728-734. DOI: 10.1097/GIM.0b013e3181b3f42d
- Ersig, Hadley, & Koehly (2011) Health Communication, 26:7, 587-594. DOI: 10.1080/10410236.2011.558338
- Gardy et al (2011) New Eng J Med, 364, 730-9.
- Lurie et al (2009) Acad Med, 84:8, 1029-35. DOI: 10.1097/ACM.0b013e3181ad16d3

Acknowledgements

- Laura Koehly, PhD
- Don Hadley, MS, CGC
- Anthony Paik, PhD
- Lioness Ayres, PhD, RN
- The LINKS Social Network Analysis Workshop, University of Kentucky

Questions?

Anne L. Ersig, PhD, RN

anne-ersig@uiowa.edu

The University of Iowa College of Nursing