

Introduction to Social Network Analysis in Active Living

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Meg Patterson

[Bit.ly/SNAworkshop](https://bit.ly/SNAworkshop)


February 2, 2020

A decorative network diagram in the top-left corner, featuring a complex web of interconnected nodes and edges. The nodes are represented by small circles, some of which are highlighted with a darker shade. The edges are thin lines connecting the nodes, creating a dense, interconnected structure.

Introductions

This is a “network” workshop, after all!

Tell us your name, affiliation, and your experience with network analysis

A decorative network diagram in the bottom-right corner, featuring a complex web of interconnected nodes and edges. The nodes are represented by small circles, some of which are highlighted with a darker shade. The edges are thin lines connecting the nodes, creating a dense, interconnected structure.

Objectives

- Recognize and understand social network terms and theoretical premise when used in research.
- Explain how social network analysis can be used to answer research questions.
- Determine if social network analysis theory or methods can be used in projects you are/will be working on.

What's in store?

Agenda

- SNA Background, Terms, and Theory
- Network Measures
- Data Collection and Management
- Hypothesis Testing
- Group Case Study
- Wrap up

A decorative network diagram at the top of the slide, featuring a complex web of interconnected nodes and lines. A central node is highlighted with a dashed circle and a solid circle, containing a blue double quote symbol.

“

Social Network Analysis: *a theory and set of methods focused on the meaning of connections and social structure.*

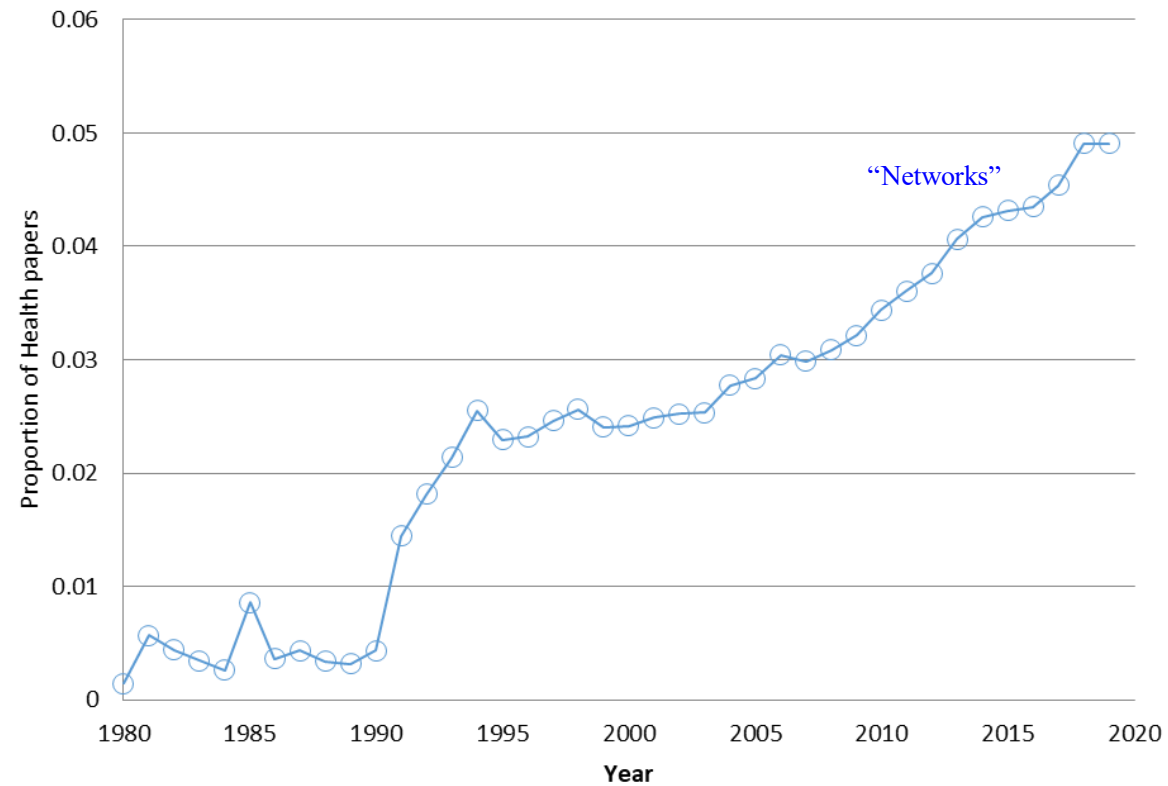
The point of SNA

- ◎ Relationships, and how we connect with one another, matter!
 - ◎ More so than individual traits or characteristics*
- ◎ The way networks are patterned and structured also matters
 - ◎ Air travel vs. Highway travel

SNA in Health

Papers on Networks and Health

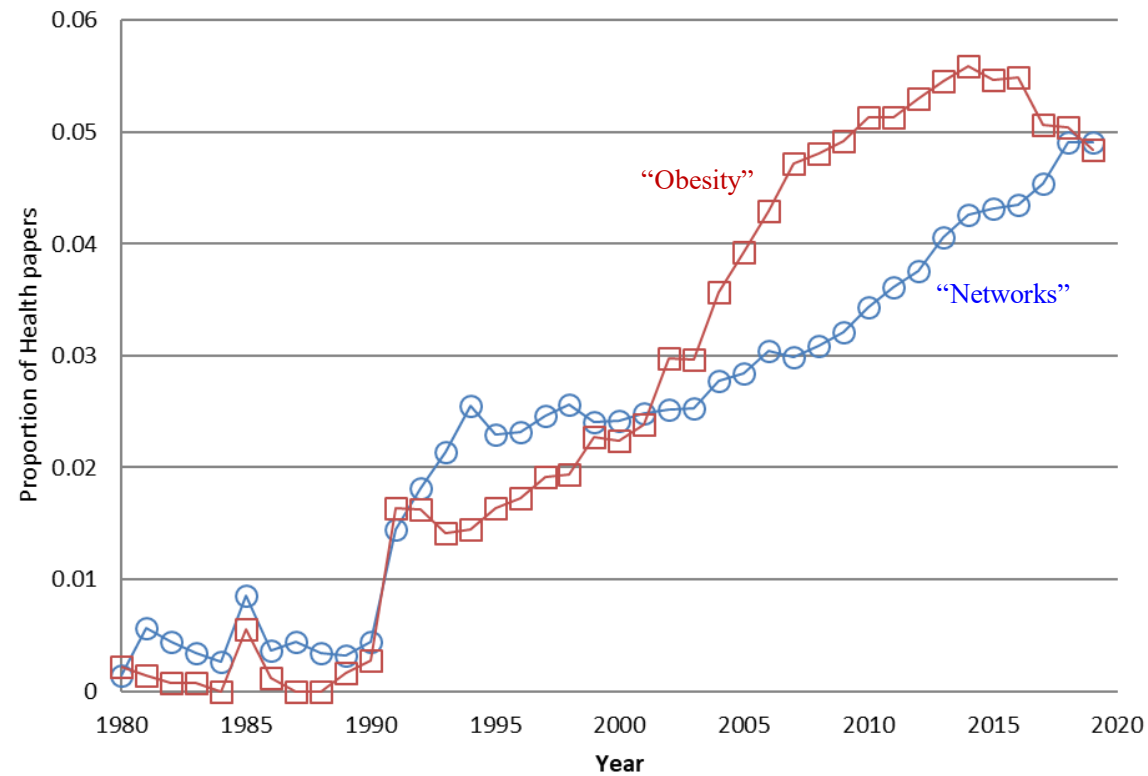
as a proportion of all papers on health



SNA in Health

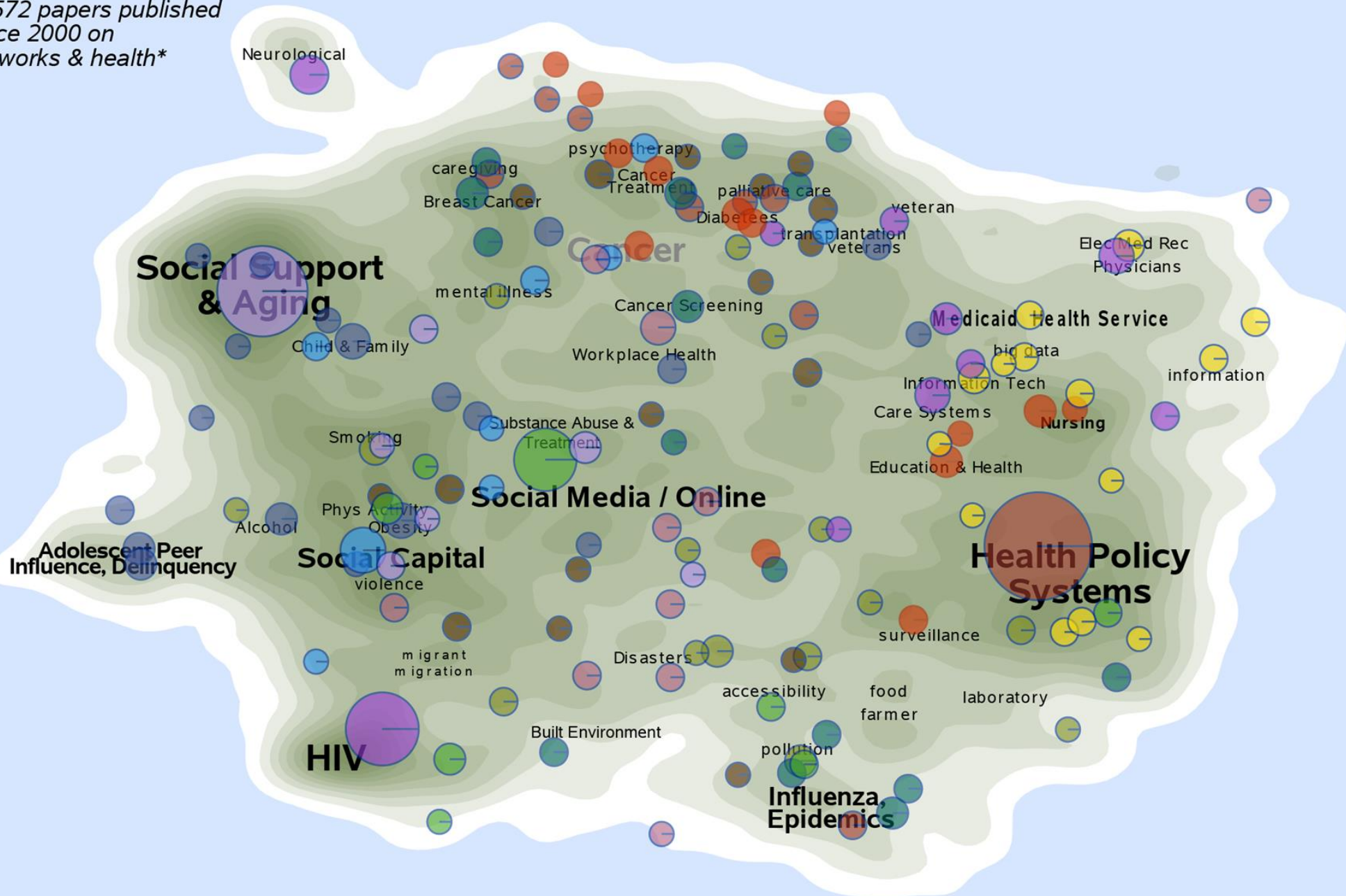
Papers on Networks and Health

as a proportion of all papers on health



Social Networks & Health Intellectual Landscape

18572 papers published
since 2000 on
networks & health*



search was "Network" and (Health or Medicine or well-being)

A decorative network diagram in the top-left corner, featuring a complex web of interconnected nodes and lines. The nodes are represented by circles of varying sizes, some with concentric rings, and the lines are thin and grey. The diagram is partially cut off by the left edge of the frame.

Important Terms

Starting with the basics

A decorative network diagram in the bottom-right corner, similar to the one in the top-left. It shows a cluster of interconnected nodes and lines, with nodes represented by circles of different sizes and some having concentric rings. The lines are thin and grey. The diagram is partially cut off by the bottom and right edges of the frame.

Network

A group of individual
entities connected in a
meaningful way



Node/Actor/Agent

Individual units

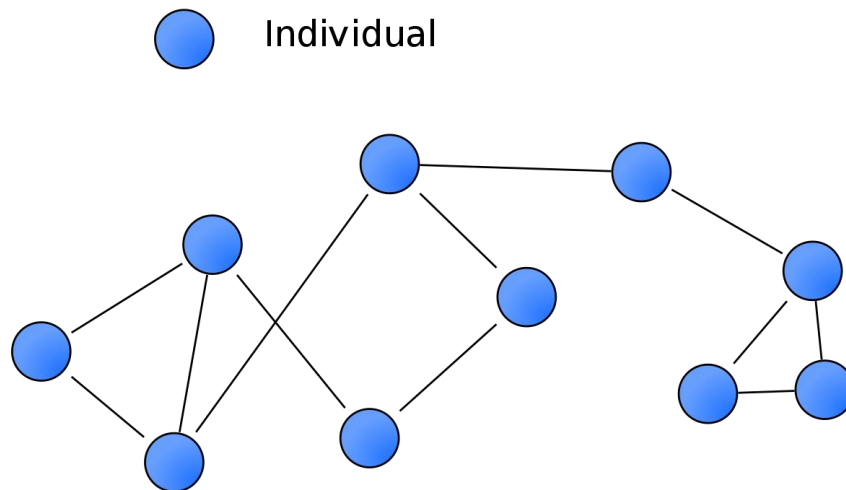
Can be many things!

- People
- Organizations
- States
- Proteins
- Nuerons

Edge/Tie/Connection

Defined relationship or connection between nodes

- Directed or undirected
- Reciprocal or not



Attributes vs. Relations

Attributes: What we measure all the time!

- ◎ Income
- ◎ Education
- ◎ Gender
- ◎ Self-efficacy
- ◎ Behavioral variables (e.g., physical activity)

Relations: ties and structures within networks

- ◎ Who do you know, talk to, trust, spend time with, etc.
- ◎ How closely are you connected to others? How many people are you connected to?
- ◎ Is the network you're apart of dense, hierarchical, clustered and does that matter?

Basic Assumptions that make SNA different

- ◎ Independence is NOT assumed
 - Actually, that's an irresponsible way to think, according to network theory
- ◎ “The whole is more than the sum of its parts”
 - Nonlinearity
 - Inputs and outputs
 - Variance explained

Why Might We Need SNA?

- ◎ Dissatisfaction with attribute theories of behavior
- ◎ “Qualintative”
- ◎ More realistic modeling of human behavior
 - ◎ Behaviors and diseases spread through social contacts, so model that!
- ◎ Develop better programs/interventions!

Why Might We Need SNA?

- ◎ It's SUPER interesting!!
- ◎ The field is growing and continues to be “written”
- ◎ Applies across physical, biological, and social sciences



“

*“For the last thirty years, empirical social research has been dominated by the sample survey. But as usually practiced, ... the survey is a sociological meat grinder, **tearing the individual from his social context and guaranteeing that nobody in the study interacts with anyone else in it.**”*

Allen Barton, 1968 (Quoted in Freeman 2004)

A decorative network diagram in the top-left corner, featuring a complex web of interconnected nodes and edges. The nodes are represented by circles of varying sizes, some with concentric rings, and the edges are thin lines connecting them. The diagram is rendered in a light gray color.

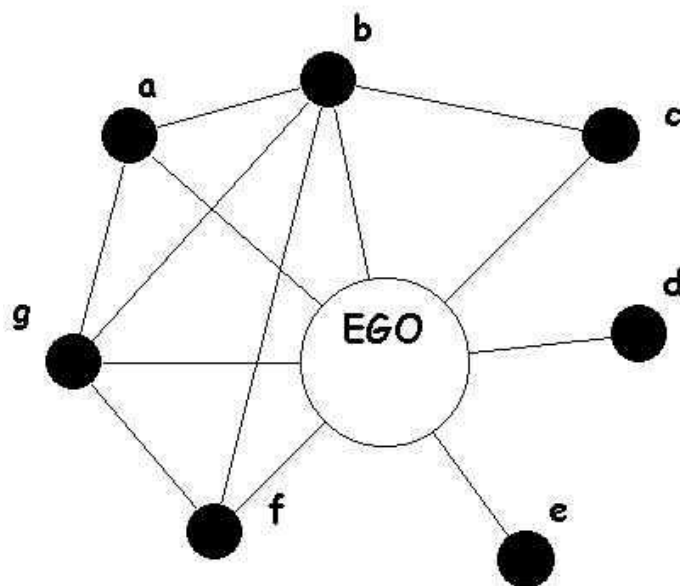
Two Approaches to SNA

Egocentric and Whole Network Research

A decorative network diagram in the bottom-right corner, similar to the one in the top-left, showing a complex web of interconnected nodes and edges in a light gray color.

Egocentric vs. Whole Networks

Egocentric Network

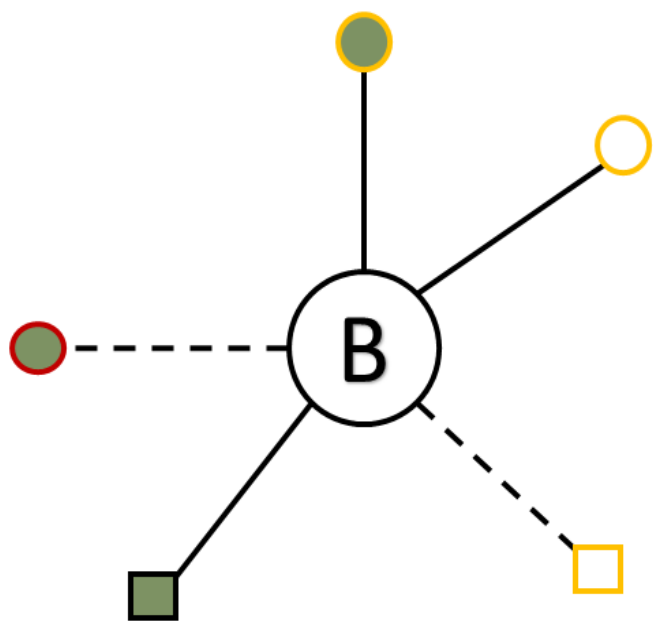
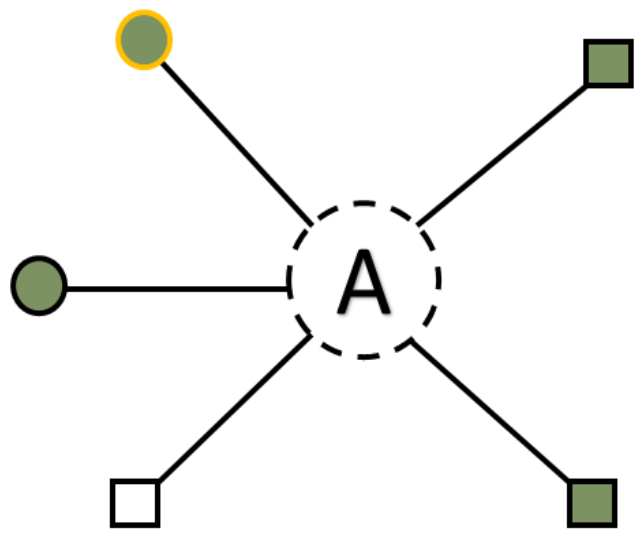


Whole Network



Egocentric Network Research

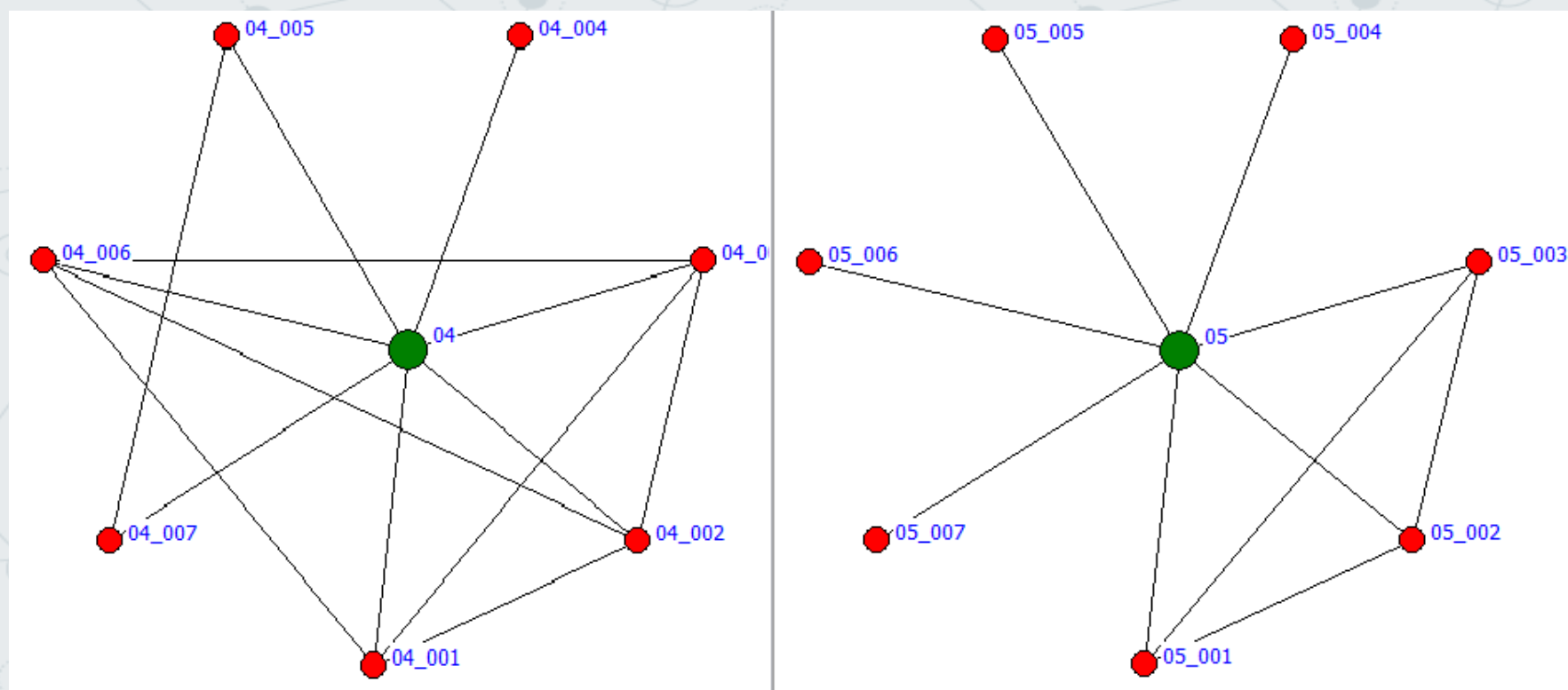
- ◎ Focuses on personal networks of individual people
 - The ego is the "hub" of the network
- ◎ Constrained by the environments and activities in which the ego is embedded
- ◎ Fits well within standard social/behavioral research



— Female
 --- Male
 ○ FitWell member
 □ Not a member

Friend
 Coworker
 Spouse

Supportive
 Not supportive



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Egocentric Network Activity

Handout

A decorative network diagram in the bottom-right corner, similar to the one in the top-left, featuring a complex web of interconnected nodes and edges. The nodes are represented by circles of varying sizes, some with concentric rings, and the edges are thin lines connecting them. The diagram is rendered in a light gray color.

Egocentric Network Measures

- ◎ Composition
- ◎ Homophily
- ◎ Heterogeneity
- ◎ Structural Holes

Egocentric Network Examples and Research Questions

Journal of Physical Activity and Health, 2018, 15, 755-762
<https://doi.org/10.1123/jpah.2017-0570>
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Human Kinetics 
ORIGINAL RESEARCH

The Role of Ego Networks in Compulsive Exercise Behavior Among a Sample of College Sorority Women

Megan S. Patterson and Patricia Goodson

Background: Compulsive exercise (CE) is a harmful form of exercise that elevates the risk of developing/sustaining clinical eating disorders. College-aged sorority women are especially prone to CE. Due to the pronounced impact social relationships have on college students' behavior, this study aims to examine personal networks and CE among a sample of sorority women through an egocentric network analysis. **Methods:** A total of 204 women in a sorority from a large, private university in the southeastern United States completed a cross-sectional survey in spring 2015. Descriptive and regression analyses were conducted on demographic, attribute, and ego network data. **Results:** Relationships with siblings, significant others, and roommates were protective against CE in this sample. Conversely, body dissatisfaction and exercise frequency predicted CE. **Conclusions:** Findings suggest that social relationships can impact CE behaviors in this sample. Along with promoting body satisfaction and healthy exercise, public health efforts should focus on facilitating close interpersonal relationships, especially between sorority women and siblings, significant others, and roommates.

Keywords: social networks, personal networks, disordered exercise, obligatory exercise, social health

Egocentric Network Examples and Research Questions



JOURNAL OF AMERICAN COLLEGE HEALTH
<https://doi.org/10.1080/07448481.2019.1679150>



MAJOR ARTICLE



Social networks, group exercise, and anxiety among college students

M. S. Patterson, PhD, MPH^{a,b} , L. R. Gagnon, MPH^{b,c}, A. Vukelich, MEd^b, S. E. Brown, BSPH^{a,b}, J. L. Nelon, MPH^a, and T. Prochnow, MEd^d 

^aDepartment of Health & Kinesiology, Texas A&M University, College Station, Texas, USA; ^bDivision of Student Life, Baylor University, Waco, Texas, USA; ^cMissouri Council for Activity & Nutrition, University of Missouri Extension, Columbia, Missouri, USA; ^dDepartment of Health, Human Performance, and Recreation, Baylor University, Waco, Texas, USA

ABSTRACT

Objective: This study aimed to evaluate the relationship between group exercise membership, social network characteristics, and general state anxiety in a sample of college students. **Participants:** 490 undergraduates from a private university in the southern US participated in the study. **Methods:** An egocentric network analysis was conducted to test whether demographic variables, leisure-time physical activity, group exercise membership, flourishing scores, and network variables were related to anxiety. **Results:** Regression analyses ($R^2 = .174$, $F = 7.650$, $p < .0001$) suggest group exercise membership ($\beta = -.105$, $p = .034$) and flourishing scores ($\beta = -.342$, $p < .0001$) were related to lower anxiety scores, while being a racial/ethnic minority ($\beta = .094$, $p = .036$), and having personal networks composed of more people who exercise often ($\beta = .100$, $p = .025$), were related to higher anxiety scores in this sample. **Conclusions:** Findings suggest a connection between group exercise membership, activity habits of peers, and anxiety. Encouraging group exercise participation could be an effective way of combating anxiety for college students.

ARTICLE HISTORY

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KEYWORDS

Egocentric networks; mental health; physical activity; social support

Whole Network Research

- ◎ Considers all sets of ties among all members of a given network
- ◎ All alters in a whole network are egos, and all egos are alters*
 - No longer a focal ego
- ◎ Allows for individual, group, and network level analysis

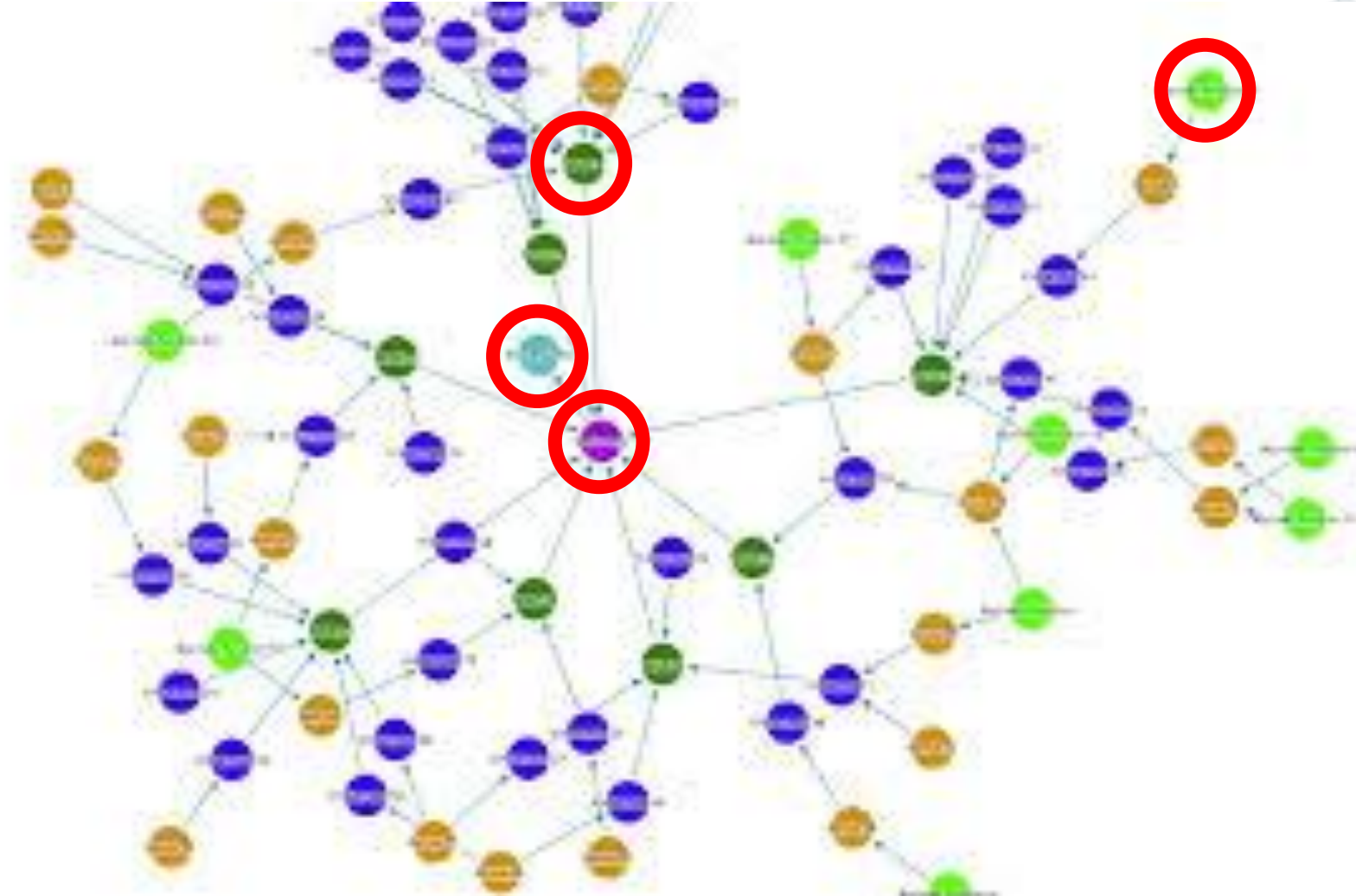
Whole Network Measures: Centrality

- ◎ A property of a person's position in a network
 - Where does someone “land” in relation to other nodes in a network?
- ◎ Central nodes usually carry positions of popularity, power, and prestige
 - Centrality typically implies structural importance
- ◎ Central nodes often have influence in behavior spread across a network

Whole Network Measures: Centrality

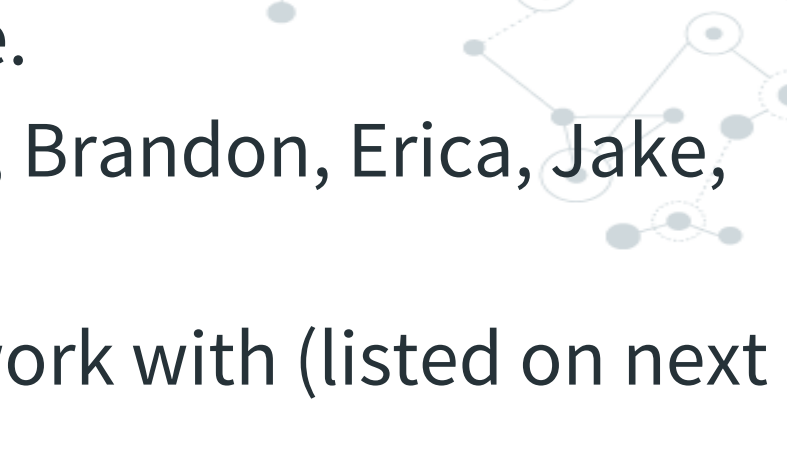

- ◎ Several measures of centrality
 - Degree
 - Betweenness
 - Eigenvector Centrality
 - Closeness

Centrality

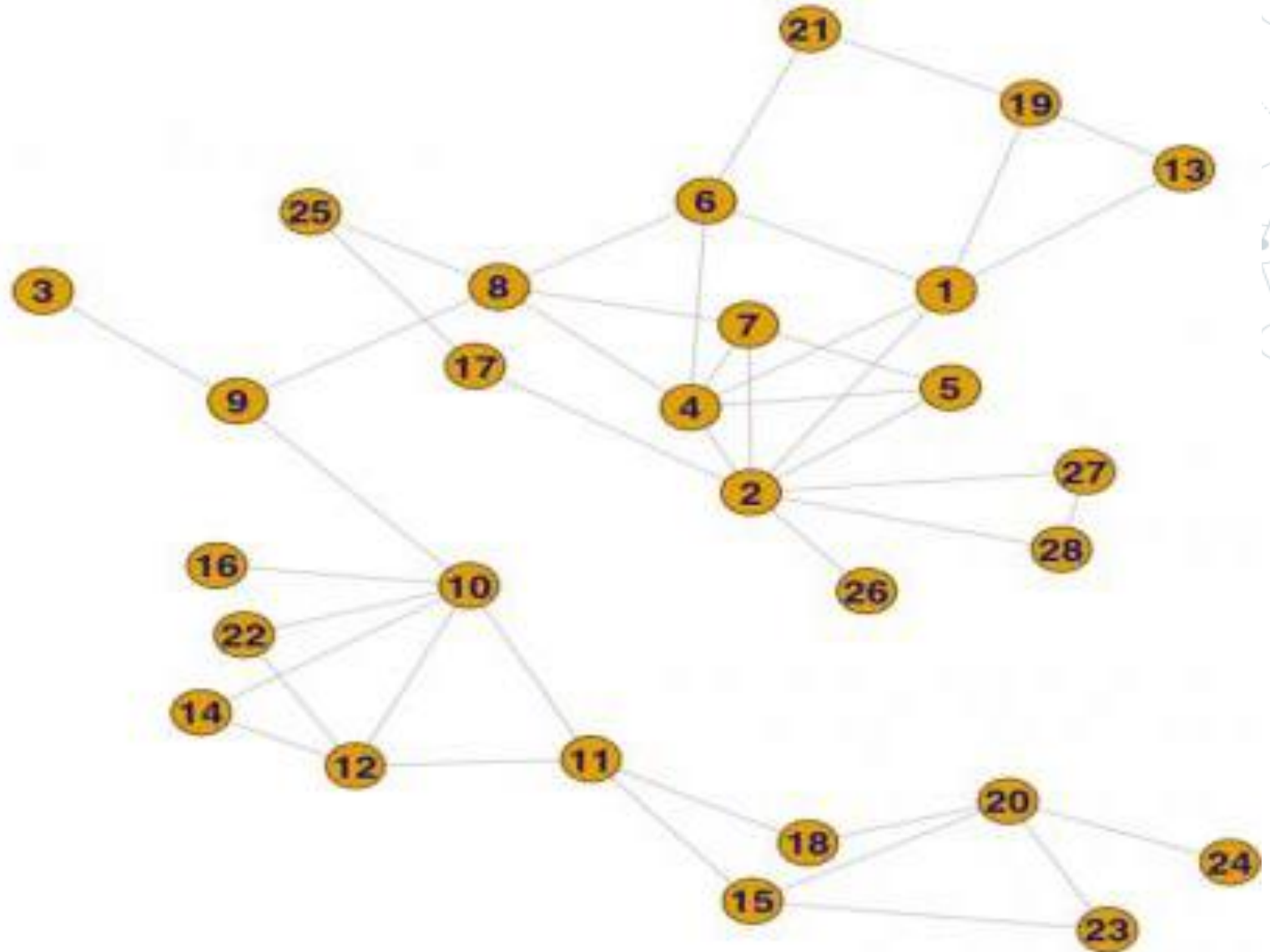




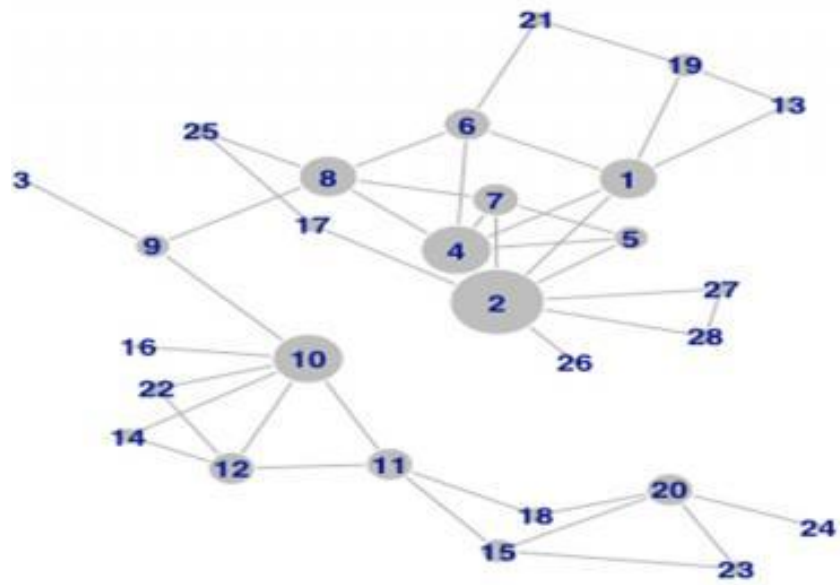
Centrality Activity

- 
- ◎ Stolen secrets from drawer in office.
 - ◎ 5 suspects (not in the room): Adam, Brandon, Erica, Jake, Lisa
 - ◎ Can only speak to the people you work with (listed on next slide)
 - ◎ Each round you can exchange one clue (any clue you have been given) with one person you work with (dyadic exchange)
 - ◎ Track clues on sheet.
 - ◎ Rounds will last 1 minute
- 

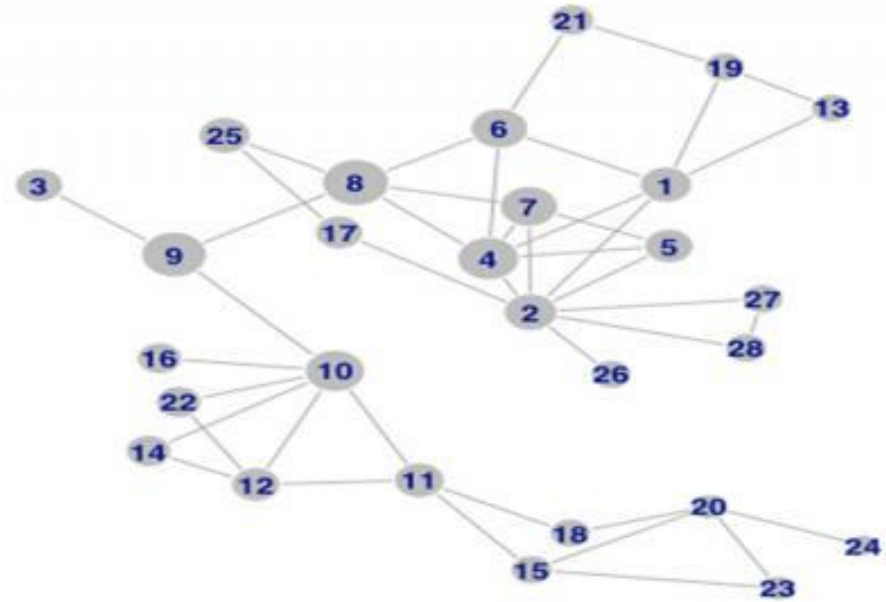
1	2	4	6	13	19			
2	1	4	5	7	17	26	27	28
3	9							
4	1	2	5	6	7	8		
5	2	4	7					
6	1	4	8	21				
7	2	4	5	8				
8	4	6	7	9	25			
9	3	8	10					
10	9	11	12	14	16	22		
11	10	12	15	18				
12	10	11	14	22				
13	10	19						
14	1	12						
15	11	20	23					
16	10							
17	2	25						
18	11	20						
19	1	13	21					
20	15	18	23	24				
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28	2	27						



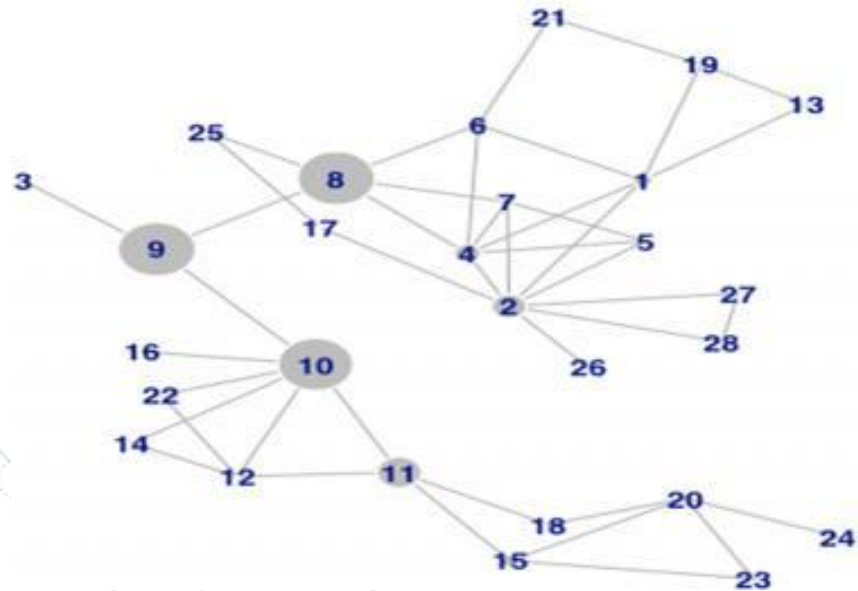
Degree Centrality



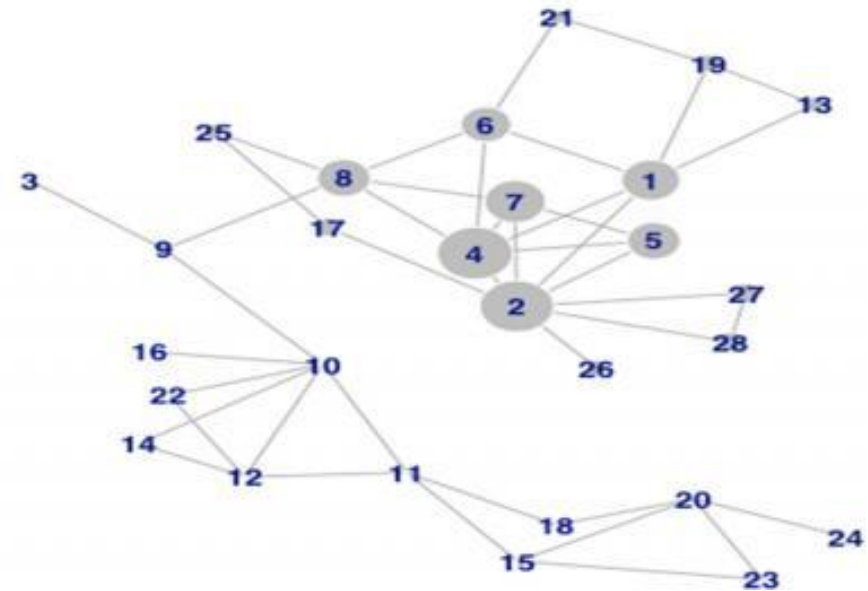
Closeness Centrality



Betweenness Centrality



Eigenvector Centrality



Whole Network Measures: Group-Level

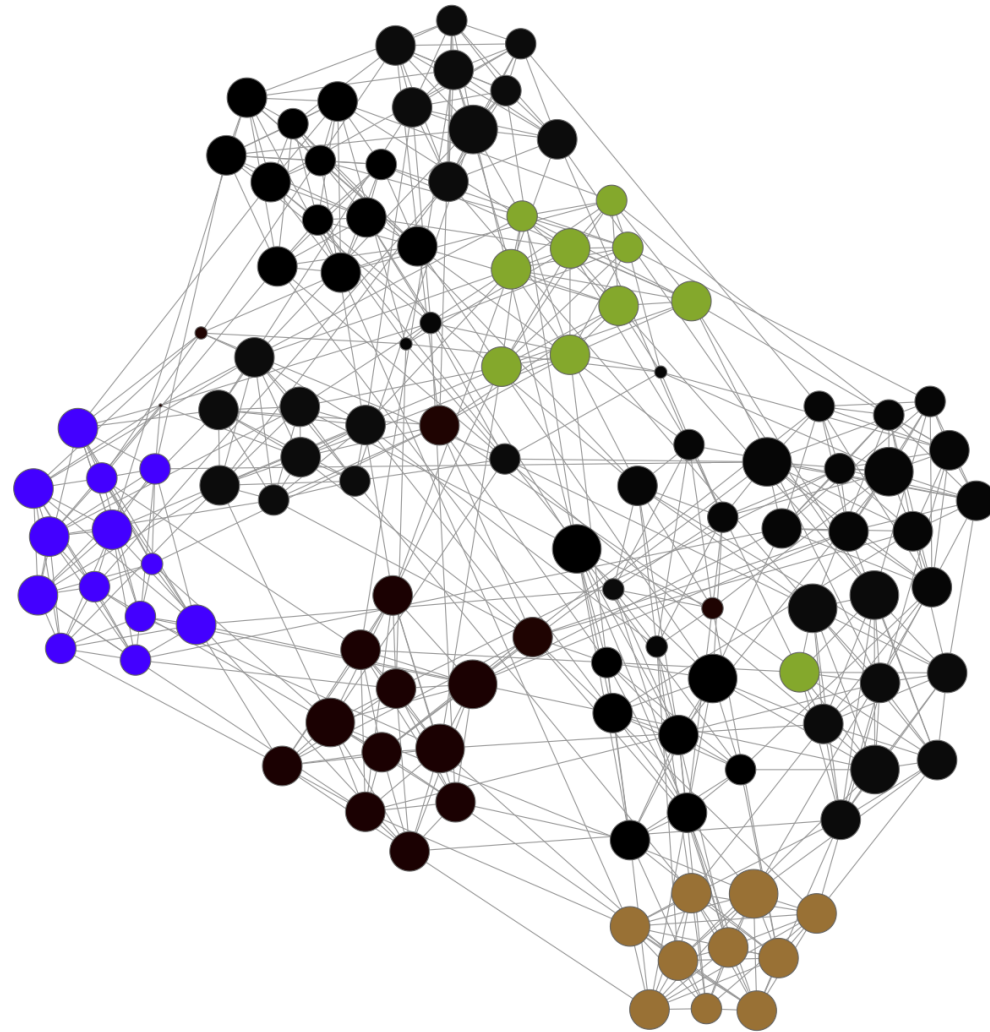
◎ Subset of a network

- Component (most basic): all nodes that can reach one another through any number of steps; nodes that cannot reach one another are in a separate component of the network
- K-core: subset of the network in which each node is connected to at least K other people
 - ◎ Creates a density factor for groups
- Clique: all members of a group are connected to all members of that group

◎ SNA posits that people who engage in a particular behavior are often surrounded by other people who also engage in that behavior, or at least approve of doing so

- Homophily

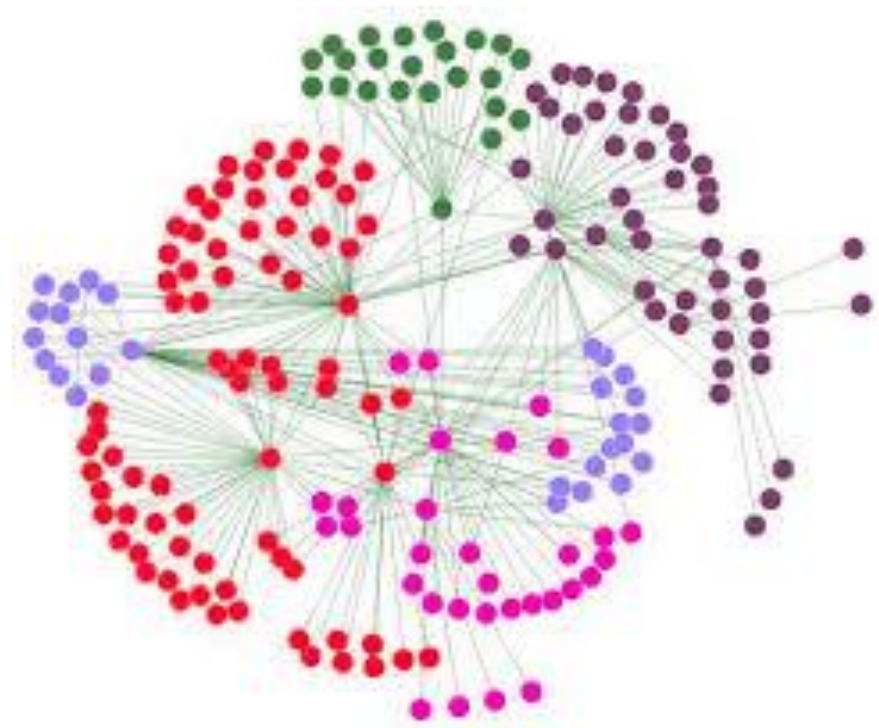
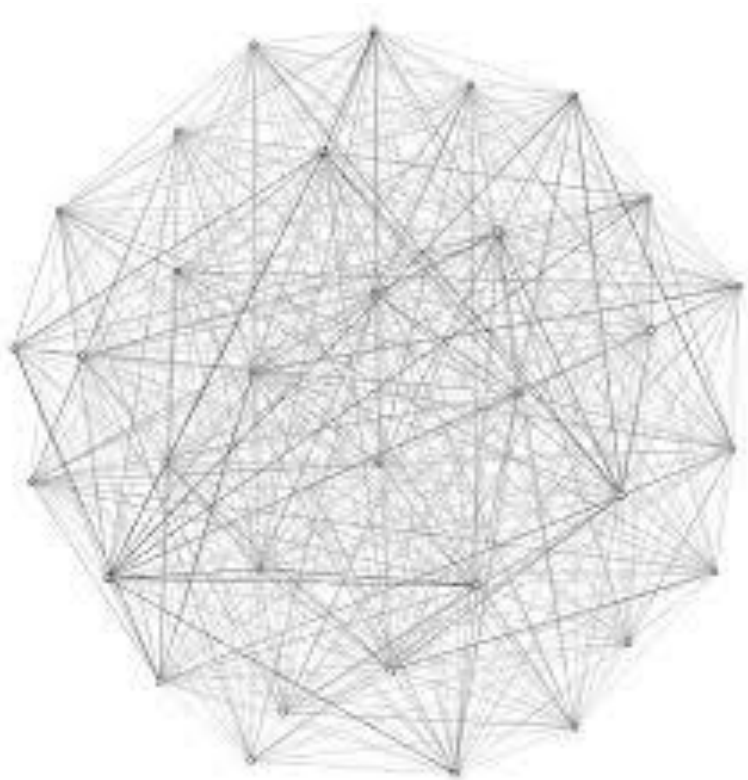
Group-Level Measures



Whole Network Measures: Network-Level

- ◎ Calculated on the whole network (as opposed to each node)
- ◎ Investigates the network from a global (or bird's eye) perspective
 - Density
 - Centralization
 - Average path length

Density and Centralization



Whole Network Examples and Research Questions

JOURNAL OF AMERICAN COLLEGE HEALTH
<https://doi.org/10.1080/07448481.2019.1657121>



MAJOR ARTICLE

A social network approach to analyzing body dissatisfaction among sorority members using two network generators

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ABSTRACT

Objective: This article uses social network analysis (SNA) to analyze how various measures of social connectedness relate to body dissatisfaction (BD) in sorority members.

Participants: 208 sorority members participated in the study.

Methods: Measures of social connectedness (network variables) were created based on two relational networks: persons members felt closest to and persons they spent the most time with. SNA tested whether demographic variables, body mass index (BMI), compulsive exercise, and network variables were related to BD in both networks.

Results: Members reported BD was related to less social connectedness in the "close-to" and the "time-spent" networks, although specific network variables varied between the two. Compulsive exercise, BMI, and grade classification were related to BD in both networks.

Conclusions: How a sorority member connects to others in her network could impact BD in this population. This study supports efforts facilitating increased social connection within a sorority as a means to decrease BD.

ARTICLE HISTORY

Received 13 December 2018

Revised 24 June 2019

Accepted 13 August 2019

KEYWORDS

Body image; Greek life;
social network analysis

Whole Network Examples and Research Questions

Social support, depressive symptoms, and online gaming network communication

Tyler Prochnow, Megan S. Patterson and Logan Hartnell

Abstract

Purpose – The increase of videogame use has raised concerns regarding mental health of gamers (e.g. social isolation, depression); however, online gaming may offer the benefit of social connectivity. Many games provide ways for people to meet and interact, providing social opportunities difficult to come by for some young adults. One way to investigate social connection is through social network analysis, which explores the influence of connections on behaviors. The purpose of this paper is to analyze factors related to social connections within an online gaming community, with an emphasis on the influence of social support and depressive symptoms on network ties.

Design/methodology/approach – All members of an online gaming site were asked to report demographics, site use, depressive symptoms, “in-real-life” (IRL) social support, and online social support. Members were also asked to nominate those in their gaming network with whom they spoke to about important life matters. Moran’s I determined the spatial autocorrelation of depressive symptoms and IRL support within the network. Exponential random graph modeling determined factors significantly associated with tie presence between members.

Findings – Members ($n = 37$) were significantly more likely to speak to other members about important life matters if they reported more site hours, more depressive symptoms, and less IRL support. Depressive symptoms and IRL support were not significantly spatially autocorrelated within this network.

Originality/value – Results suggest members may be filling an IRL social support deficit with friends they have met online. Additionally, members who reported more depressive symptoms may be seeking help from informal online connections through online gaming.

Keywords Social support, Social network analysis, Depressive symptoms, Help seeking, Online gaming

Paper type Research paper

Tyler Prochnow is based at the Baylor University, Waco, Texas, USA.

Megan S. Patterson is based at the Texas A&M University College Station, College Station, Texas, USA.

Logan Hartnell is based at the Adler University, Chicago, Illinois, USA.

A decorative background featuring a network diagram. It consists of numerous nodes, represented by small circles, some of which are solid grey and others are hollow with a grey outline. These nodes are interconnected by thin, light-grey lines, forming a complex web-like structure that is more dense on the left and right sides of the image and sparser in the center where the text is located.

Let's Take a Break!

A decorative background featuring a network diagram with nodes and connecting lines, primarily located in the top-left and bottom-right corners. The nodes are represented by circles of varying sizes, some with concentric rings, and the lines are thin and light gray.

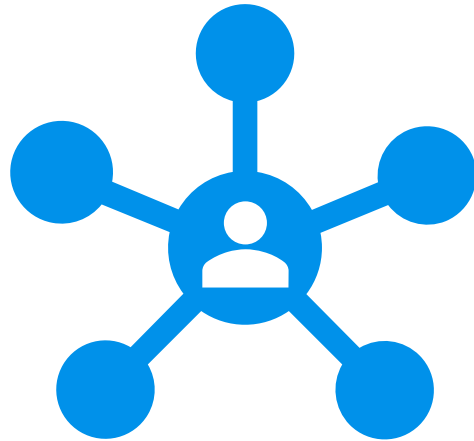
Data Collection and Management

Survey Design

- ◎ Network Generator – question or prompt which generates a list of alters related to a specific relationship or connection
 - Connect, interact, communicate, influence
- ◎ Name interpreters – questions designed to collect information regarding the alters listed above
 - Gender, age, frequency of contact, perception of activity/support
- ◎ Alter interrelater – questions designed to determine connections between alters
 - Does Tom know Bob?
 - Details structural holes

Egocentric

- ◎ Can use all three – generator, interpreter, interrelater
- ◎ Alter names are not needed – why?
- ◎ Collect information on alters from the ego's perspective
 - Alter Limits – Some surveys limit the number of alters an ego can nominate



Egocentric Example

22-26.	22. Person 1	23. Person 2	24. Person 3	25. Person 4	26. Person 5
a. Person X Initials / Name					
b. Is [Person X] a boy or girl?	<input type="checkbox"/> Boy <input type="checkbox"/> Girl	<input type="checkbox"/> Boy <input type="checkbox"/> Girl	<input type="checkbox"/> Boy <input type="checkbox"/> Girl	<input type="checkbox"/> Boy <input type="checkbox"/> Girl	<input type="checkbox"/> Boy <input type="checkbox"/> Girl
c. What is your relationship to [Person X]? (Are they your...)	<input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Sibling <input type="checkbox"/> Friend <input type="checkbox"/> Relative <input type="checkbox"/> Other: _____	<input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Sibling <input type="checkbox"/> Friend <input type="checkbox"/> Relative <input type="checkbox"/> Other: _____	<input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Sibling <input type="checkbox"/> Friend <input type="checkbox"/> Relative <input type="checkbox"/> Other: _____	<input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Sibling <input type="checkbox"/> Friend <input type="checkbox"/> Relative <input type="checkbox"/> Other: _____	<input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Sibling <input type="checkbox"/> Friend <input type="checkbox"/> Relative <input type="checkbox"/> Other: _____
d. How old is [Person X]?					
e. Does [Person X] live....?	<input type="checkbox"/> In your household <input type="checkbox"/> In your neighborhood <input type="checkbox"/> Outside your neighborhood <input type="checkbox"/> I don't know	<input type="checkbox"/> In your household <input type="checkbox"/> In your neighborhood <input type="checkbox"/> Outside your neighborhood <input type="checkbox"/> I don't know	<input type="checkbox"/> In your household <input type="checkbox"/> In your neighborhood <input type="checkbox"/> Outside your neighborhood <input type="checkbox"/> I don't know	<input type="checkbox"/> In your household <input type="checkbox"/> In your neighborhood <input type="checkbox"/> Outside your neighborhood <input type="checkbox"/> I don't know	<input type="checkbox"/> In your household <input type="checkbox"/> In your neighborhood <input type="checkbox"/> Outside your neighborhood <input type="checkbox"/> I don't know
f. How often do you actively play with [Person X]?	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
g. How many hours per week do you think [Person X] usually exercises in their free time, so much	<input type="checkbox"/> None <input type="checkbox"/> About half an hour <input type="checkbox"/> About one hour <input type="checkbox"/> About 2-3 hours	<input type="checkbox"/> None <input type="checkbox"/> About half an hour <input type="checkbox"/> About one hour <input type="checkbox"/> About 2-3 hours	<input type="checkbox"/> None <input type="checkbox"/> About half an hour <input type="checkbox"/> About one hour <input type="checkbox"/> About 2-3 hours	<input type="checkbox"/> None <input type="checkbox"/> About half an hour <input type="checkbox"/> About one hour <input type="checkbox"/> About 2-3 hours	<input type="checkbox"/> None <input type="checkbox"/> About half an hour <input type="checkbox"/> About one hour <input type="checkbox"/> About 2-3 hours

Whole Network

- ◎ Only uses name generator
 - All other elements are reported by the others in the network
- ◎ Roster based - supplies a roster of names from the bounded network
 - Can be helpful to match names
 - May be difficult with large networks or not possible if you do not have all of the names
- ◎ Free recall - the ego supplies names from memory
 - Larger networks or networks in which you do not know all members
 - May be difficult to match names (Bob/Robert)
- ◎ Both come with a level of bias – roster may lead to over reporting, free recall may lead to under reporting

Whole Network - Example

For the following questions please refer to the Organization ID Sheet. Please list all, if any, organizations that fit each question. Please write the ID followed by a comma for multiple answers.

Which organizations within the OPHCC, if any, have you collaborated with most frequently in the past year?
(please list as many organizations that apply)

Which organizations within the OPHCC, if any, have you competed with most frequently in the past year?
(please list as many organizations that apply)

Which organizations within the OPHCC, if any, does your organization have non-financial formal agreements with? (please list as many organizations that apply)

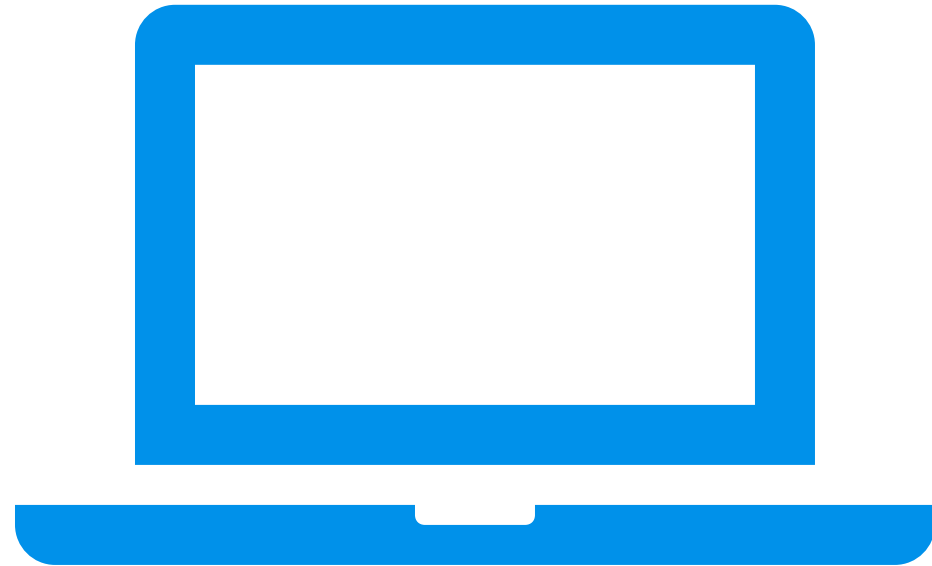
Survey Administration

- ◎ Researcher administered – industry standard
- ◎ Online surveys – can be difficult based on software
- ◎ Nomination limits
- ◎ Roster / Recall



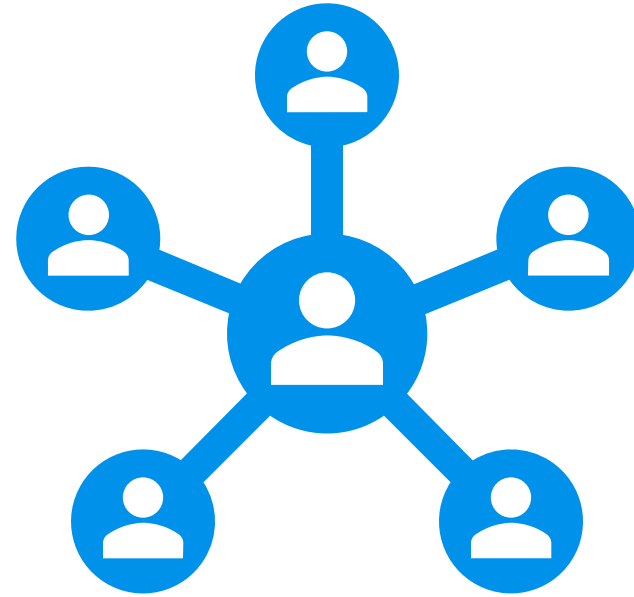
Software Available (collection)

- © EgoWeb2.0
- © PARTNER
- © Network Canvas
- © Enso (formerly OpenEddi)
- © Qualtrics



Other types of collection

- ◎ Observational networks
- ◎ Natural networks
- ◎ Two-mode networks
- ◎ Cognitive mapping
- ◎ Public record



Observational Networks

- ◎ Observational techniques similar to SOPARC, SOPLAY, SOFIT can be modified to track target individuals and the interactions between them and others
- ◎ Multiple timepoints are needed to detail multiple connections

Natural Networks

- ◎ Existing networks
- ◎ Example: Parks or crossings connected by trails / paths
 - Nodes – parks and attributes of the park
 - Ties / Edges – trails which connect them
 - May determine important trails to maintain or parks which are important midpoints in trail networks

Two-Mode Networks

- © Nodes are not connected to each other but are connected through a second type of node (mode)
- © Example: people using a park
 - person -> park -> person
- © Reveals the parks or PA resources people may have “shared”



Cognitive Mapping

- ◎ Type of whole network interviewing based on perception
- ◎ Every member asked to map all connections between every person in the network
- ◎ Perceptions of all individuals are overlapped and condensed to develop a final network
- ◎ Example: adolescents connections at after-school program

Public Records

- ◎ Social media accounts – scraping data from accounts
- ◎ Email records
- ◎ Public announcements
- ◎ Organization member lists

Data Files

- ◎ Relational data: connects one node to another
- ◎ Edgelist: easiest form – A-B, B-C, A-D
- ◎ Matrix: all members are listed on X and Y axis, 1 is placed in each cell which a connection is present a 0 is placed if there is no connection

	A	B	C	D	E
A	-	1	1	0	1
B	1	-	1	0	0
C	0	0	-	1	0
D	0	1	0	-	0
E	1	0	0	0	-

A	B
A	C
A	E
B	A
B	C
C	D
D	B
E	A

Data Files

- © Attribute table – file containing all ego information
- © Demographics, outcome variables, etc.

A decorative background featuring a network diagram with nodes and connecting lines, primarily located in the top-left and bottom-right corners. The nodes are represented by circles of varying sizes, some with solid centers and others with dashed outlines. The connecting lines are thin and gray, forming a complex web-like structure.

Hypothesis Testing

Network Questions

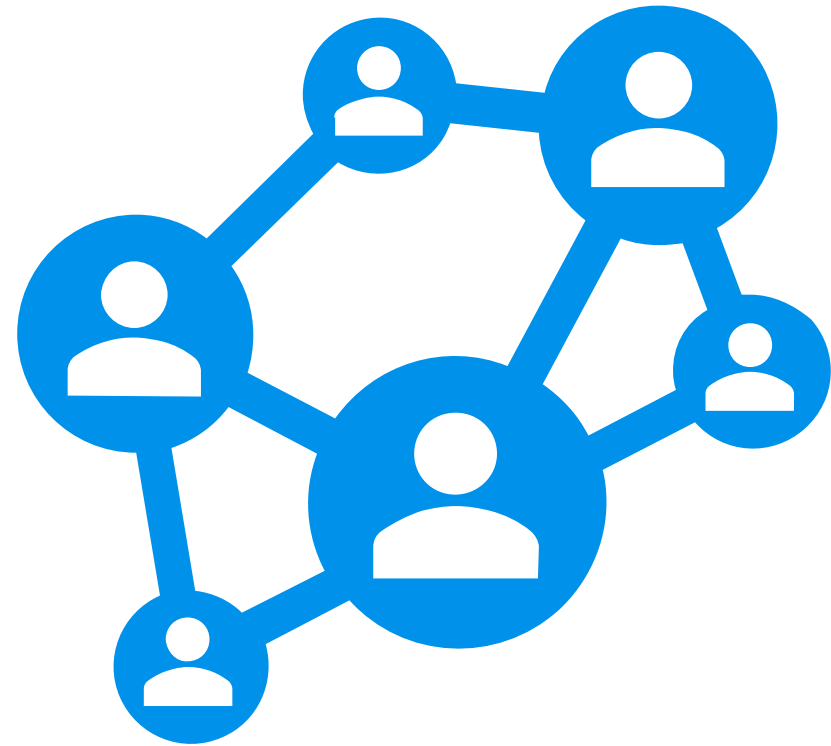
- ◎ Network Theory – Network variables as explanatory variables
 - Networks cause some outcome
 - Where a node is positioned impacts what the node does/is influenced by.
 - Diffusion of Innovations
 - Peer Influence
 - Disease transmission

Network Questions

- ◎ Theory of networks – Network variables as outcome variables
 - Attributes cause how a network forms or is maintained
 - What attributes impact how a node connects with others in the group
 - Social Integration / Selection
 - Popularity or structuration

Descriptive

- ◎ Centrality
- ◎ Communities
- ◎ Composition of networks
- ◎ Structural holes
- ◎ Triad Census



Permutation Testing

- ◎ Many network analyses use permutation testing
 - the use of simulated data to test for statistical significance
- ◎ Used to properly manage the interdependent nature of social network data

Quadratic Assignment Procedure

- ◎ Uses matrix math to determine significant associations between matrices
- ◎ Reshapes the matrix and conducts associations
 - correlation or regression
- ◎ The dispersion of a variable throughout the network is significantly associated with the social structure.
- ◎ Example: Are “Played with” and “Friends with” networks significantly associated.

IV

Network or Attribute

DV

Network or Attribute

Linear Network Autocorrelation Models

- ◎ Determine the network effects (or spatial autocorrelation) of a variable within the network while controlling for other variables
- ◎ Determines the associations between variables while controlling for network effects
- ◎ Example: MVPA = Self-efficacy+age+Sex+network effects
 - Network effects – the level of association between ego's MVPA and the MVPA of their connections.

IV

Network and Attribute

DV

Attribute

Exponential Random Graph Modeling

- ◎ Determines significant factors associated with tie presence within the network.
- ◎ Example: NETWORK= nodefactor(sex) +nodematch(age) +nodecov(MVPA)
 - Are ties significantly more likely in females?
 - Are ties significantly more likely between individuals with the same age?
 - Are ties significantly more likely among individuals with more MVPA?

IV

Network and Attribute

DV

Network tie

Stochastic Actor Oriented Modeling

- ◎ Blend of LNAM and ERGM – determine significant predictors of tie formation/dissolvment and attribute change over time.
- ◎ Model significant associations in the manner by which nodes are influenced over time by modeling both network and individual level effects.
- ◎ Longitudinal
- ◎ Example: MVPA – do adolescents become more like friends or make friends with those who are similar over time?

IV

Network and Attribute

DV

Network and Attribute

HLM / MLM

- ◎ Used in Egocentric analysis
- ◎ Determine significant associations between attributes and network composition
- ◎ Determine unique variance explained by network level factors
- ◎ Example – Skill Competency =
 $\text{Age} + \text{Sex} + \text{MVPA} + (\# \text{ of network members who are active}) + (\text{Structural holes}) + (\# \text{ of network members who help ego be active})$

IV

Network or Attribute

DV

Network or Attribute

Software (Analysis)

- ◎ SPSS – MLM/HLM *
- ◎ UCINET – QAP *
- ◎ R – Everything *
- ◎ SAS, STATA – Everything
- ◎ E-net – Egocentric
- ◎ Other applications: Gephi, Pajek, NodeXL

The background features a light gray abstract network diagram. It consists of numerous circular nodes of varying sizes, some of which are double-outlined. These nodes are interconnected by thin, light gray lines, forming a complex web-like structure that is more dense on the left and right sides of the slide.

Group Case Study

Activity

◎ Develop a network study based on shared interest

◎ Objectives:

- Identify the network
 - ◎ What are your Nodes and Ties?
 - ◎ Egocentric or whole?
- What research question are you answering?
- What variables are you measuring?
- How will you collect data
 - ◎ Network generators, interpreters, interrelaters?
- Analysis?

◎ 2-3 minute elevator pitch report to group

A decorative network diagram in the top-left corner, featuring a complex web of interconnected nodes and lines. The nodes are represented by circles of varying sizes, some with solid centers and others with dashed outlines. The lines are thin and gray, creating a mesh-like structure.

Resources

Add these to your reading list:

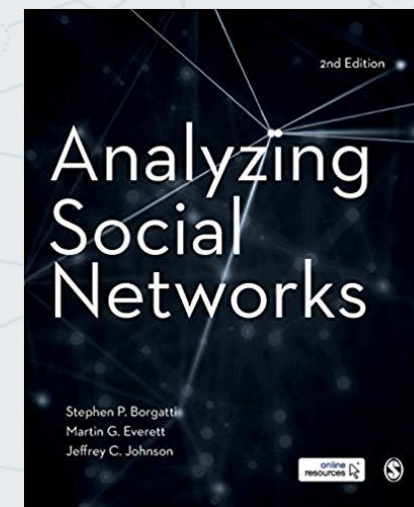
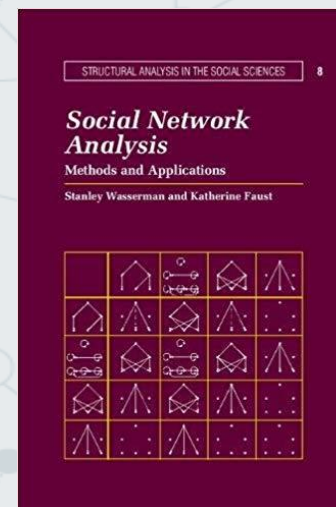
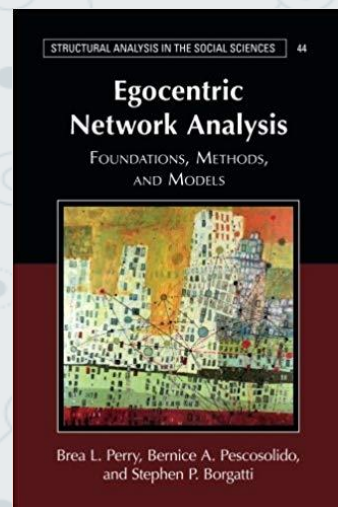
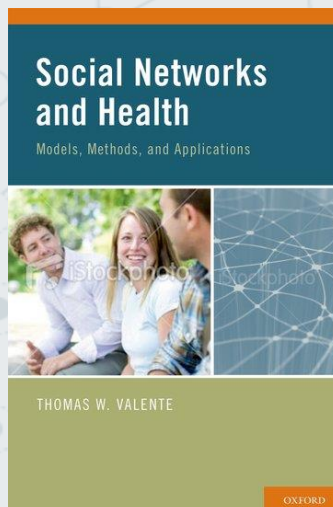
Social Networks and Health: Models, Methods, and Applications – Thomas Valente

Egocentric Network Analysis – Brea Perry

Social Network Analysis: Methods and Applications – Stanley Wasserman and Katherine Faust

Analyzing Social Networks – Steven Borgatti, Martin Everett, and Jeffrey Johnson

Network Science – Albert-Laszlo Barabasi (networksciencebook.com)



Other Resources

◎ Massive Open Online Courses

- Coursera
- EdX

◎ Conferences and Trainings

- International Network for Social Network Analysis
- Duke Network Analysis Center
- LINKS (University of Kentucky)

Take Aways!

- ◎ SNA offers a new way of thinking about activity
- ◎ SNA comes with a set of methods that helps us consider the meaning behind connections within a system
- ◎ Properties of networks are meaningful to behaviors, including centrality, homophily, density, and others.
- ◎ Statistical significance testing in SNA considers the interdependence of data within analysis
- ◎ There's so much more to learn and we're here to help!

A decorative network diagram in the top-left corner, featuring a complex web of interconnected nodes and lines. The nodes are represented by small circles, some of which are solid grey and others are hollow with a grey outline. The lines connecting them are thin and grey, creating a dense, organic structure.

Final Words

Questions or Comments?

<http://bit.ly/SNApostworkshop>

A decorative network diagram in the bottom-right corner, similar to the one in the top-left. It shows a cluster of nodes connected by lines, with some nodes being solid grey and others hollow with grey outlines. The overall pattern is a complex, interconnected web.

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