Mother's Social Networks and Child Oral Health Outcomes

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Outline

1. Background: Social Network Research

1. Research Findings

2. Next Steps

Background

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Complex System Approach to Oral Health Disparities Research

Independent observations

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Dependencies between individuals

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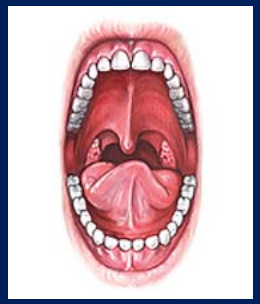
Diez Roux AV. *Am J Public Health*. 2011.
Frerichs L, Lich KH, Dave G, Corbie-Smith G. *Am J Public Health*. 2016.

Why Social Networks?

Social networks can impact health

- Obesity
- Infectious Diseases (HIV)
- Mental Health (Depression, Drug Addiction)
- Cardiovascular Disease (Stroke)



Childhood oral health information is passed through relationships

Macdonald-Wallis et al. *Am J Prev Med*. 2012.
Yang et al. *J Community Psychol*. 2013.
Latkin et al. Am J Public Health. 2011.
Rudolph et al. *Ann Epidemiol*. 2013.
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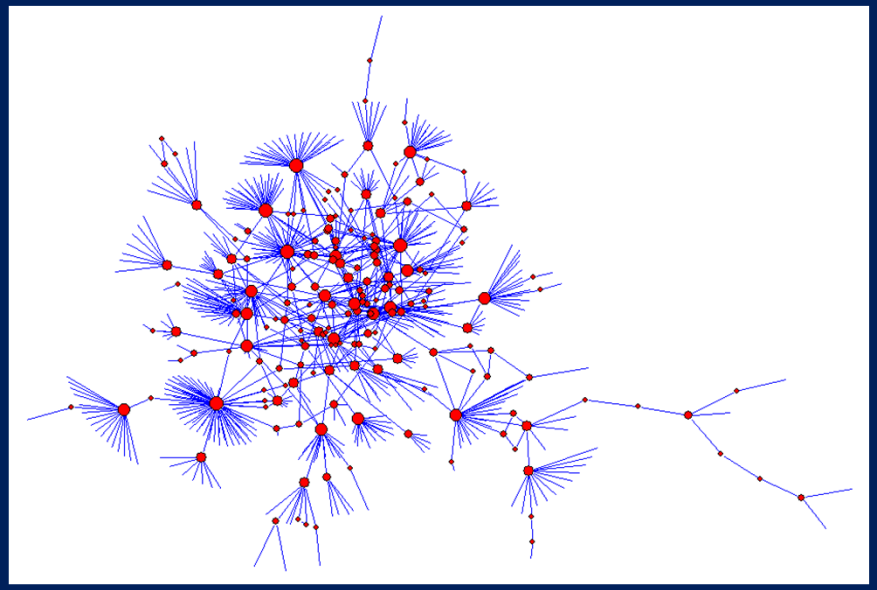
Iida et al. *Am J Public Health*. 2013.
Nelson et al. *J Dent Res*. 2012.
Nahouraii et al. *J Health Care Poor Underserved*. 2008.
Lewallen LP. *Public Health Nurs*. 2004.

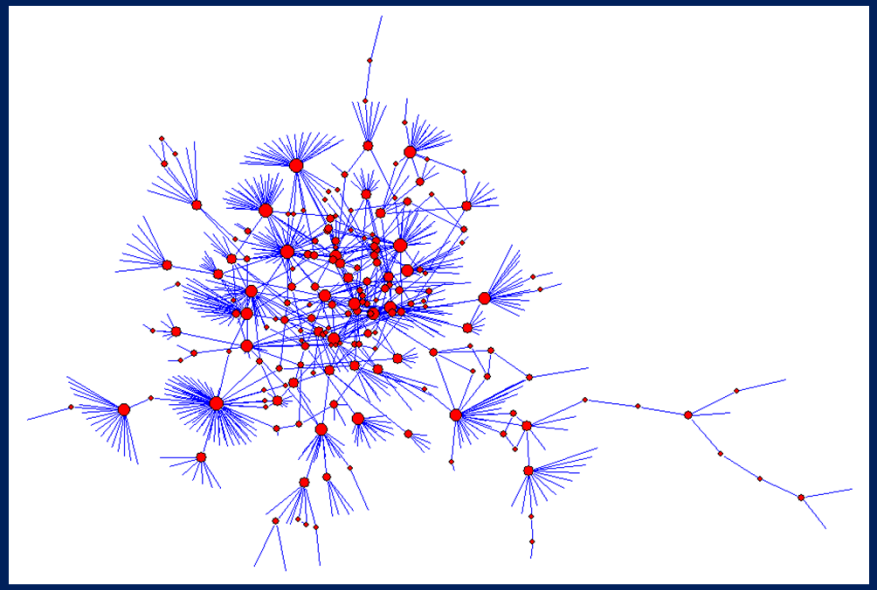
What is Social Network Analysis?



A set of *relational* methods for systematically understanding and identifying connections among individuals.

Patterns in face-to-face relationships

What is Social Network Analysis?

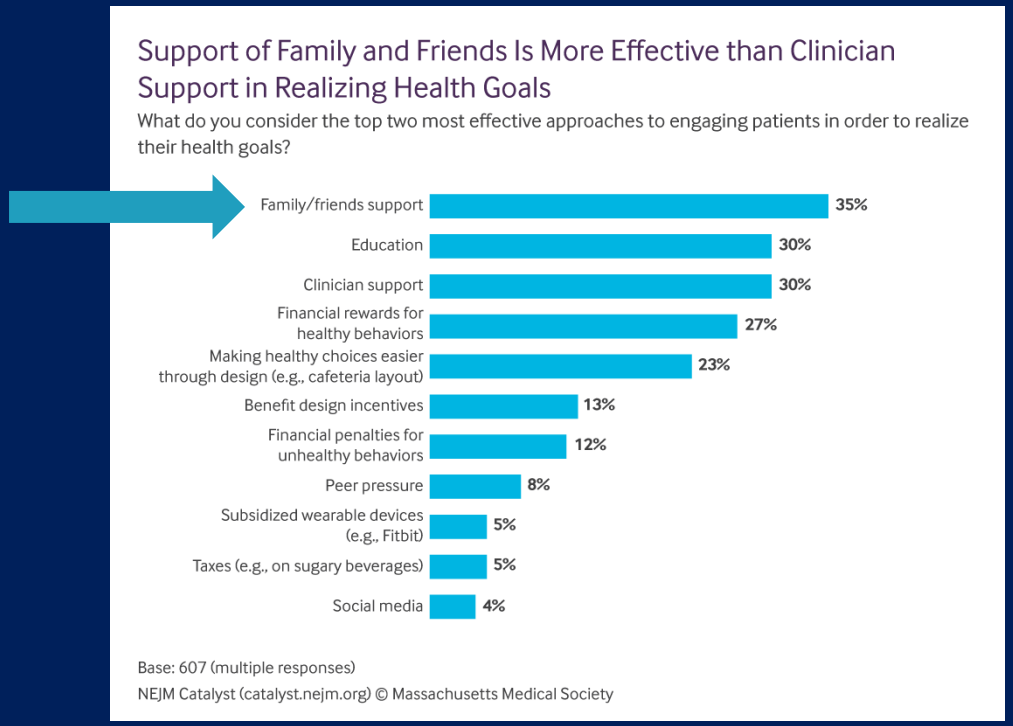


Examples of Social Network Variables:

- Network Size
- Centrality Measures (Degree)
- Cohesion Measures (Density)
- Similarity Measures

  Proportion of connections with a similar characteristic

Why Social Network Analysis?



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Why do children in Appalachia have high levels of oral disease?

Individual outcomes have strong social determinants

Strong kin relationships

Unique Appalachian culture

Social Network?

Networks are the "active ingredients of environmental influences" (Neurons to Neighborhoods)

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McNeil, Crout, and Marazita (2012) "Oral Health", in Appalachian Health and Well-being. Eds. Ludke and Obermiller.
Institute of Medicine. 2000. *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Washington, DC: The National Academies Press.

Research

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Objective

Network Dental Use

Proportion of mothers' connections who saw the dentist in the past year

Social Influence

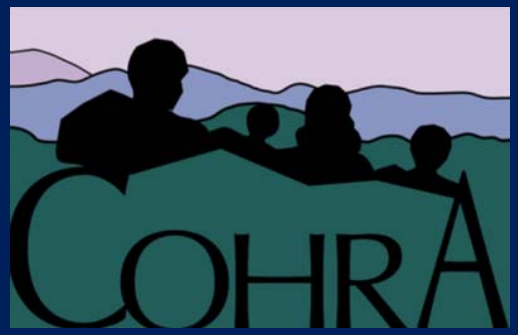
Child Preventive Dental Use

Methods

Cross-Sectional Study

In-person data collection on the mother's social network

- Quantitative name-generator survey (20 min)
- *Qualitative* semi-structured interview (40 min)
- Informed by community advisory board



Recruitment

Center for Oral Health Research in Appalachia (COHRA) Study

- Collected data on child oral health outcomes

Data Collection

3 Staff: 2 in West Virginia and 1 in Pennsylvania

Recruitment

- Phone call, email, newsletter and annual study visits
- Interviews scheduled ahead of time

Setting

- Same location as the COHRA parent study
- Play space for children
- Thank you gift bag and books for mom and children
- $50 incentive

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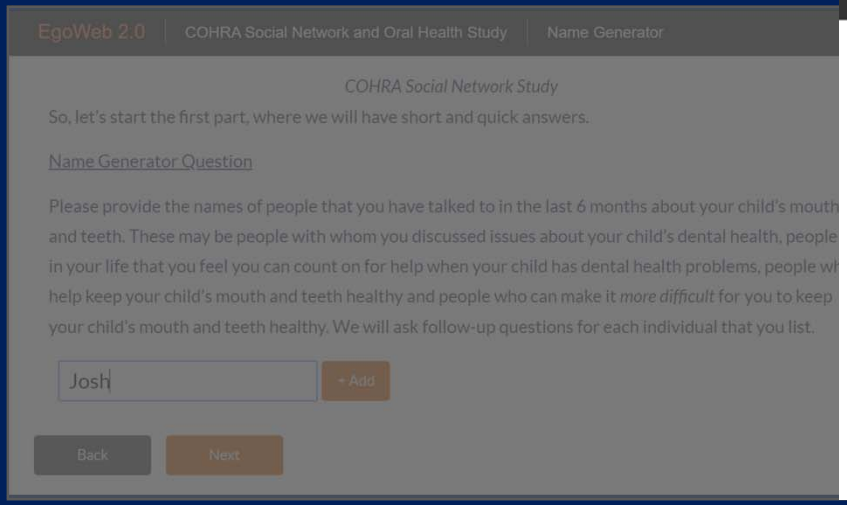
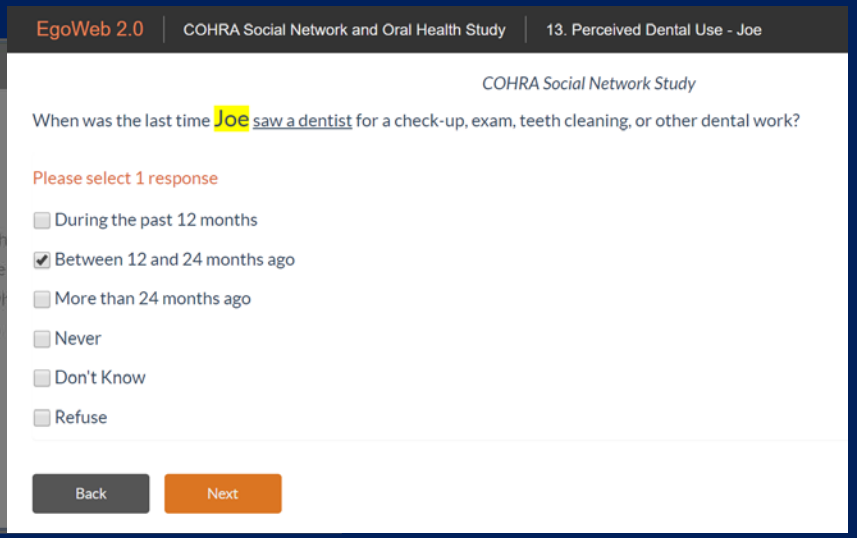
Data Collection

Characterizing the Social Network





First, mothers list connections related to child oral health.

Then, mothers answer questions for each connection.

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Sample

Inclusion Criteria

Individual

- Mother >18 years
- Child age 3-5 years
- English-speaking

Area

- Participating in COHRA in
  - Pennsylvania
  - West Virginia

Sample Size: 126 Mother-child pairs

Quantitative Analytic Approach

Main Outcome Variable: Child preventive dental use (binary)

- Check-up, examination, or cleaning
- Sealants applied
- Fluoride treatment applied

Main Exposure Variable: Network Dental Use (continuous, proportion)
Proportion of mother's connections who saw a dentist in the past year

$$\frac{\text{\# ``During the past 12 months''}}{\text{Total \# connections}} = \%$$

Unadjusted Bivariate Descriptive Analyses

Descriptive Results

Table 1. Bivariate Analysis of Family Sociodemographic Characteristics, Stratified by Child Preventive Dental Use (N=126).

	Overall % or Mean (SD)	Child Preventive Dental Use (n=87)	No Child Preventive Dental Use (n=39)	p-value
		% or Mean (SD)	% or Mean (SD)	
Family Sociodemographic Characteristics				
Child Age	4.77 (1.02)	4.80 (1.04)	4.70 (0.97)	0.296
Child Dental Insurance				0.596
Private	61%	73%	33%	
Public	14%	16%	10%	
None	25%	10%	56%	
Mother's Education				<0.001
≤ High School or Equivalent	14%	11%	79%	
Some College or Associate Degree	28%	22%	41%	
Bachelor's Degree	30%	33%	23%	
Master's, Doctorate or Professional Degree	28%	15%	33%	
Family Income				0.004
Under $50,000	41%	30%	67%	
$50,000-99,999	37%	47%	15%	
$100,000 or more	16%	17%	13%	

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Descriptive Result on Mothers' Social Networks

Table 2. Bivariate Analysis of Network Characteristics, Stratified by Child Preventive Dental Use (N=126).

	Overall Mean (SD)	Child Preventive Dental Use (n=87) Mean (SD)	No Child Preventive Dental Use (n=39) Mean (SD)	p-value
Network Dental Use	0.74 (0.34)	0.80 (0.29)	0.59 (0.39)	<0.001

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More network dental use in the mothers' network among the group with a preventive dental visit

Significant association between dental use among mother's connections and child preventive dental use

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Descriptive Result on Mothers' Social Networks

If none of the mother's connections had dental use in the past year, the model estimates only a 38% chance that the mother would have taken their child for a preventive dental visit.

If all of the mothers' connections visit the dentist in the past year, the model estimates a 79% chance of child preventive dental use.

40 percentage points

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Quantitative Analytic Approach

Unadjusted Bivariate Descriptive Analyses

Adjusted Logistic Regression controlling for the following

Family Characteristics	Mother's Network Characteristics
Child Age (continuous)	Network Size (count)
Child Dental Insurance (4-level category)	Network Oral Health Status Proportion of connections with good oral health status (continuous, proportion)
Mother's Education (4-level category)	Network Dental Trust Proportion of connections who trust dentists (continuous, proportion)
Family Income (3-level category)	Network Closeness Mean Relationship strength score from 1 to 10, divided by 10 (continuous, proportion)

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Table 3. Logistic Regression Model on the Association between Dental Use Among Mother's Connections and Having a Preventive Dental Visit for Her Child (N=126).

	Coefficient	95% CI	p-value
Network Characteristics			
Network Dental Use			
Network Size			
Network Oral Health Status			
Network Dental Trust			
Network Closeness			
Family Sociodemographics			
Child Age			
Child Dental Insurance			
None			
Private			
Public			
Mother's Education			
≤ High School or Equivalent			
Some College or Associate Degree			
Bachelor's Degree			
Master's, Doctorate or Professional Degree			
Family Income			
Under $50,000			
$50,000-99,999			
$100,000 or more			
Constant			

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Qualitative Analytic Approach

Semi-structured Qualitative Interview Domains

- Dental Utilization
- Cariogenic Diet
- Home care for teeth
- Dental Problem

Interviews were:

- Transcribed (TranscribeMe)
- Coded (Nvivo12, Template Analysis)
- Analyzed (Grounded Theory Approach)

Qualitative Results

Well, yeah. Can you imagine bringing a baby in? Like, what the hell is the dentist even gonna do? They're babies.

I was told to bring both the kids at [age] one. And I did. And it was horrible!

That's what my pediatrician recommended!

Okay, that sounds miserable! I think I'm going to stick with [age] three on this one.

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Summary of Findings

Quantitative: More dental use in a mother's social network is significantly associated with preventive dental use for her child ($p<0.01$).

Dental use

Dental use

Qualitative: Mothers are influenced by the dental health-seeking behaviors of their connections, both positively and negatively.

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Limitations

- Interim data analysis with a small sample size
- Limited generalizability
- Potential measurement bias
- Validity of oral health research instruments
- Limited theoretic basis to modeling on social network characteristics

Significance & Innovation

Significance

Applies systems science to dental research

Link mother's social network to child dental outcomes

Innovation

Further the field of social network analysis

- Negative support
- Mixed methods

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Discussion

First study to use egocentric network data and methods

Adds to the literature on the impact of the social environment on health outcomes

Potential for Public Health Impact

- First step toward Intervention

Next Steps

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Next Steps

Continue Virtual Data Collection

Secondary Data Analyses on Social Networks

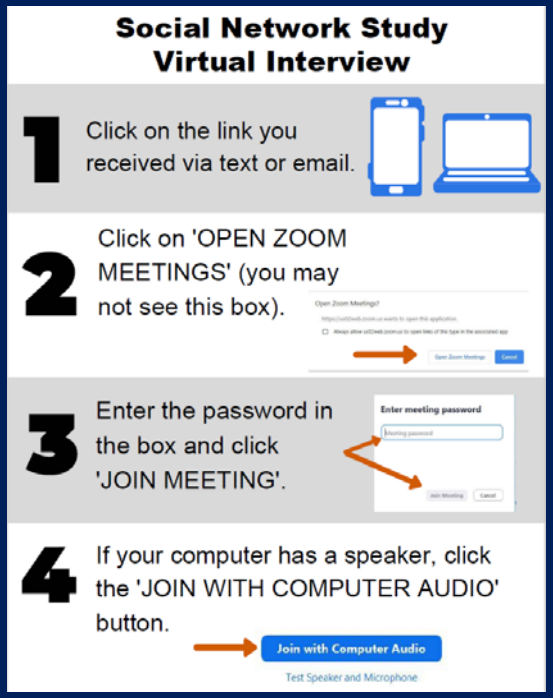
- Adolescents (NIDCR R03)

Pilot an Intervention!

COVID-19 Virtual Data Collection

	Prior to COVID-19 Pandemic (n=126)	During and After the COVID-19 Pandemic (Goal N=400)
IRB Approval	IRB approval 10/30/2018	IRB modification 8/24/2020
Recruitment	In-person, email, phone	Email, phone
Consent Process	In-person written consent	Online Click-to-Consent using RedCap with research staff during an "Organization Meeting."
Social Network Interview	In-person with play space for children	Virtual conference (Zoom) in a space with sound isolation and strong internet connectivity
Incentive	Gift card, gift bag and books	Load existing study gift card or send a new gift card via snail mail

COVID-19 Virtual Data Collection



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Long-term Research Goals

A Randomized Pilot Trial of a Novel Social Intervention Tailored to Mothers with Children at High Risk for Dental Caries

- Peer-based caries self-management intervention
  - 1:1 Coaching with Oral Health Expert and Advocacy Among Connections
    - Talking with family and friends about childhood tooth decay, Building confidence and self-worth, Conflict management skills
  - Group Peer-led Sessions

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Questions?

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