

Assessing the Impact of a Transdisciplinary Team Science Initiative on Scientific Collaboration Networks

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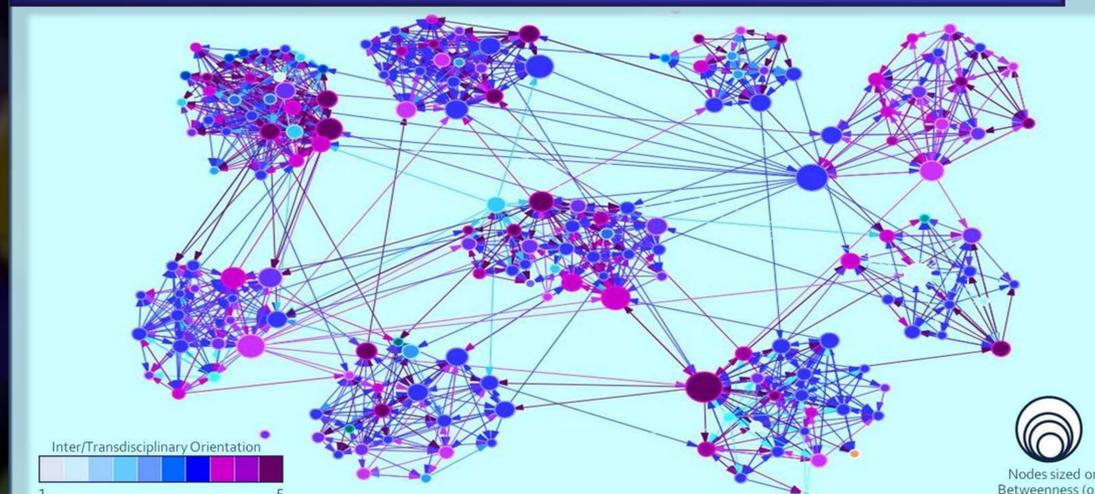
Introduction

- The Division of Cancer Control and Population Sciences (DCCPS) at the National Cancer Institute (NCI) has been a leader in funding transdisciplinary (TD) team science through large-scale team science initiatives.
- In the current study, we used social network analysis (SNA) methods to document collaboration networks among scientists participating in one such initiative, the Centers for Population Health and Health Disparities (CPHHD).
 - The CPHHD initiative, initially funded from 2003-2008, provided support for eight geographically dispersed centers for health disparities research and training.
 - After an extension period, CPHHD was renewed from 2010-2015, providing funding for 10 centers, including 3 renewed and 7 new centers.

Methods

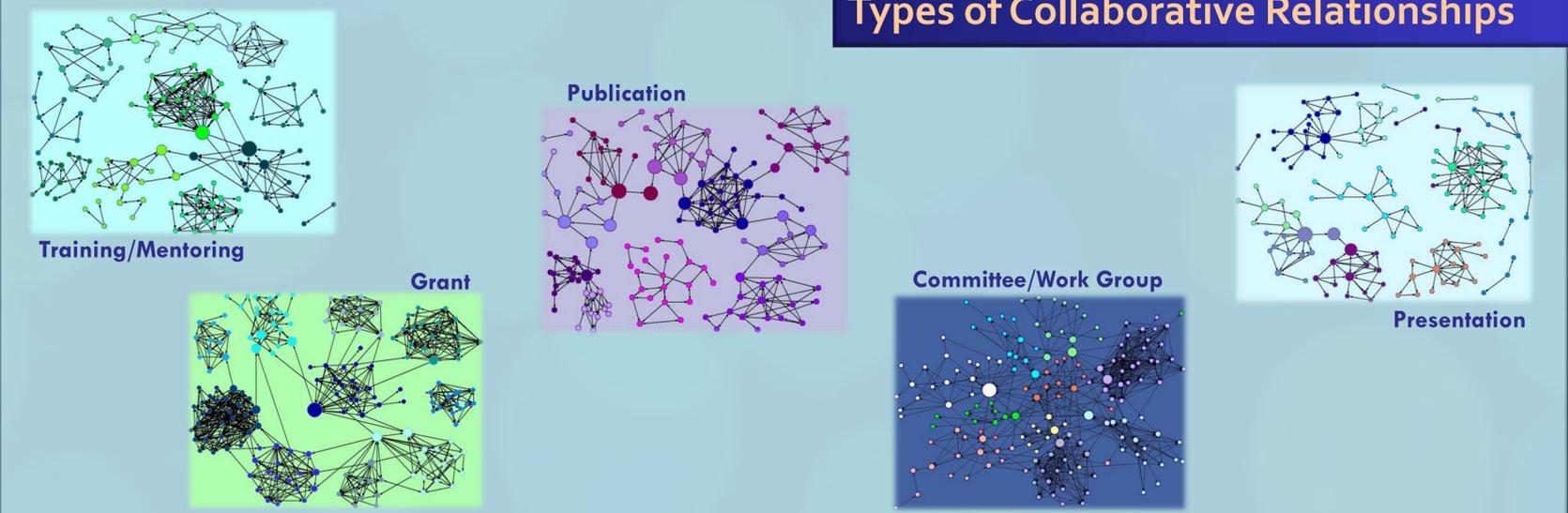
- A social network and collaboration readiness survey was completed by 167 key investigators (94%) involved in the 10 CPHHD centers from December 2010-January 2011.
 - Four of the 10 CPHHD centers had 100% response rates.
 - No center had less than an 86% response rate.
- Data was collected on investigators' current and prior collaborations.
- The Collaboration Readiness portion of the survey included the Research Orientation Scale (ROS), a 10-item scale measuring respondents' values about and attitudes towards cross-disciplinary research.
 - The ROS uses a 5-point Likert scale from *strongly disagree* to *strongly agree*.
 - Factor analysis identified three factors.
 - The three factors match up to three types of research orientation: *unidisciplinary*, *multidisciplinary*, and *inter/transdisciplinary*.

CPHHD Collaboration Network with Inter/Trans ROS



Sample Characteristics (N=167)	Mean (SD)	Range
Academic Title (%)		
Professor	36.2	
Associate Professor	23.7	
Assistant Professor	21.5	
Research Associate/Fellow	4.5	
Other	14.1	
Role within CPHHD Center (%)		
Center PI and/or Core PI (or Co-PI)	20.3	
Project PI, Co-PI, or Co-I	73.5	
Other center role	6.2	
Research Orientation Scale		
Unidisciplinary	2.02 (0.67)	1-5
Multidisciplinary	3.43 (0.94)	1-5
Inter/Transdisciplinary	4.09 (0.65)	1-5
Network Characteristics		
Betweenness	0.004 (0.02)	0-1
In-Degree	4.73 (2.96)	0-14
Out-Degree	4.73 (5.32)	0-30

Types of Collaborative Relationships



Research Questions

- Is inter/transdisciplinary research orientation related to an individuals' betweenness and/or closeness centrality in the network?
- Is inter/transdisciplinary orientation related to network brokerage?
- What network characteristics do those with a more unidisciplinary orientation have?

Results

- Inter/transdisciplinary orientation is significantly associated with betweenness centrality in the ($\beta=0.14$, $p<0.05$) collaboration network.
 - This finding indicates that those with a more inter/transdisciplinary outlook and approach tend to serve as vital connectors among people in the CPHHD initiative.
- Inter/transdisciplinary research orientation is also associated with network brokerage ($\beta=0.20$, $p<0.01$).
 - Similar to betweenness, brokers are those who act to connect otherwise unconnected people in the network – they can serve as brokers between centers or they can serve to connect others within their own center.
- There is a negative association between brokerage and a low inter/transdisciplinary orientation and high unidisciplinary orientation ($\beta=-0.41$, $p<0.05$).
 - Indicating that those with a **primarily** unidisciplinary research orientation are less likely to serve as brokers in the network.
- Closeness centrality is associated with an inter/transdisciplinary orientation ($\beta=0.15$, $p=0.02$).
 - This indicates those with an interdisciplinary orientation are closer to others in the network and have a better idea of what is going on in the network because they can more quickly and easily access information.

Discussion

- Findings demonstrate that investigators' experiences and attitudes related to transdisciplinary research collaboration are related to their positions and roles within collaboration networks.
- They also provide rich visualizations to better understand how researchers involved in a large, transdisciplinary team science initiative interact and to generate further hypotheses related to the potential influence of these networks on scientific research.

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