Using Social Network Analysis to Inform Dissemination and Implementation Efforts of Interventions

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Social Networks

• Research paradigm (Wellman, 1988)
  Moves beyond:
  - Individual attributes
  - Discrete groups
  - Isolated dyadic interactions
  Focuses on patterns of relationships

• Two key components
  Nodes (Actors in the network)
Social Networks

• Research paradigm (Wellman, 1988)
  Moves beyond:
  - Individual attributes
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• Two key components
  Nodes (Actors in the network)
  Edges (Relationships between actors)
Social Network Data Collection & Analysis

• Whole Network Data Collection
  A census of relationships in a population

• Operationalizing Relationships
  Can be measured at multiple scales
  Can be symmetric or directional

• Levels of Analysis
  System – Whole network measures (e.g., Density)
  Node – Network position (e.g., Centrality)
  Dyad – Relational measures (e.g., Structural Similarity)
Social Networks & Dissemination

• Social networks can inform dissemination and implementation by:

1. Examining patterns of existing relationships through which information about and use of new practices spreads

2. Identifying influential community members to recruit as collaborators in dissemination processes

(e.g., Hawe & Ghali, 2008, Neal et al., 2008)
Illustrative Examples

• Links to Learning Channels Study (Neal et al., 2011)

How are teachers’ advice networks associated with the frequency of use of new classroom interventions?
Diffusion Theory & Intervention Use

**GOAL**
Get the ‘target’ individual to use a new intervention

**OBJECTIVE**
Recruit a community member to spread the intervention

**QUESTION**
Who is better: A or B?
Diffusion Theory & Intervention Use

ANSWER #1: Pick A

Cohesion says interventions spread through direct connections (Coleman et al. 1957)

Why?
Increased information flow

Hypothetical Advice Network
ANSWER #2: Pick B

Structural Similarity says interventions spread among people who occupy similar roles in the network (Burt, 1987)

Why?
People imitate similar others (DiMaggio & Powell, 1983)
Hypotheses

• **Cohesion** Hypothesis

Teachers will use an intervention more frequently if it is used frequently by colleagues to whom they are connected
Hypotheses

• **Cohesion** Hypothesis
  Teachers will use an intervention more frequently if it is used frequently by colleagues to whom they are connected

• **Structural Similarity** Hypothesis
  Teachers will use an intervention more frequently if it is used by colleagues with whom they share similar patterns of relationships
Method – Sample & Data (2007)

• Sample
  29 teachers, K – 4th grade

• Social Network
  In January, asked every teacher: “From whom might you seek advice around involving families?”

• Intervention Use
  Daily use of Daily Report Card (DRC) collected between February and June (N= 355 person/week observations) (Kelley 1990)
Method – Explanatory Variables

• **Cohesion** Expected Use (COH\(_{tw}\))
  Mean frequency of use of DRC in week \(w\) by those from whom teacher \(t\) receives advice.

• **Structural Similarity** Expected Use (SS\(_{tw}\))
  Mean frequency of use of DRC in week \(w\) by those most structurally similar to teacher \(t\).
### Results - Frequency of Use of DRC*

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$R^2$ = .66

*Fixed effect estimates not shown
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R² .66

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No support for **cohesion**

Support for **structural similarity**

Long-Run Effect: For each time a teacher’s similar others use the DRC, the teacher used it .51 times

In Practical Terms: If a teacher’s similar others used the DRC daily this week and last week, the teacher is expected to use it 2.5 more times this week
Dissemination Implications

Key Opinion Leader (KOL) Models
Enlist influential community members to spread interventions

Hypothetical Advice Network
Dissemination Implications

Key Opinion Leader (KOL) Models
Enlist influential community members to spread interventions

Usually KOLs are selected based on **cohesion**

May encourage info spread

Hypothetical Advice Network

3/28/2012 jneal@msu.edu
Dissemination Implications

Key Opinion Leader (KOL) Models

Enlist influential community members to spread interventions

Usually KOLs are selected based on coherence.

May encourage info spread

But for use, they should be selected based on structural similarity.

Hypothetical Advice Network
Illustrative Examples

• **Links to Learning Channels Study** (Neal et al., 2011)
  How are teachers’ advice networks associated with the frequency of use of new classroom interventions?

• **Promoting Academic Success Study**
  Can networks be used to provide feedback to stakeholders on dissemination barriers?

  Can networks be used to provide feedback to stakeholders on influential community members?
Promoting Academic Success Study

• Intervention Goals
  To increase academic achievement among minority boys
  “Lead teachers” selected by principals to encourage attendance at PD sessions and intervention use

• Interviews asked who teachers went to for advice around issues related to minority boys:
  (1) Instructional Methods
  (2) Promoting Positive Relationships
  (3) Involving Families
  (4) Behavior Management
Barriers to Dissemination in PAS

- **Density** –
  Proportion of present to possible relationships

- **Reciprocity** –
  Proportion of reported relationships that are reciprocated
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Low density and reciprocity can create barriers to the spread of information

Only 12.9-18.1% of all possible advice relationships are present

Only 0-15.2% of all present advice relationships are reciprocal
Barriers to Dissemination in PAS

- Example – Behavior Management
Barriers to Dissemination in PAS

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Low density= lots of hard to reach teachers on the periphery
Barriers to Dissemination in PAS

• Example – Behavior Management

Low density = lots of hard to reach teachers on the periphery

Low reciprocity = very little two-way communication
Identifying Influential Teachers in PAS

- Is the principal’s “lead teacher” the most influential?

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Below or only slightly above median.
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On average, the lead teacher shares 7.8 to 13.7% of the same relationships as her colleagues.

Below or only slightly above median

On average, teacher #11 shares 14.3 to 22.6% of the same relationships as her colleagues.

• Teacher 11 is better positioned to encourage colleagues to use interventions.
Identifying Influential Teachers in PAS

- Example: Instruction
Identifying Influential Teachers in PAS

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Identifying Influential Teachers in PAS

• Example: Instruction
Summing It All Up

• Dissemination and implementation takes place within a **relational structure**
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• Understanding this relational structure is critical for narrowing the research to practice gap in schools and other contexts
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• Dissemination and implementation takes place within a relational structure

• Understanding this relational structure is critical for narrowing the research to practice gap in schools and other contexts

• Social network analysis can help researchers:
  Understand the diffusion of the use of interventions
  Identify barriers to dissemination
  Select key opinion leaders to serve as allies
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Questions or Comments?

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THANK YOU!!!