Who’s the Glue? A Social Network Analysis

Jennifer Gellock, Virginia Commonwealth University
Carrie LaCrom, Virginia Commonwealth University
Greg Greenhalgh, Virginia Commonwealth University

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Coaches are constantly looking for ways to get the best performance out of their teams, whether that be through tried and true tactical methods, intense practice regimens, health and nutrition plans, or even superstitious behaviors aimed at continuing winning streaks. Yet we still hear stories of teams who were the most talented or even most prepared, yet did not win the game, which is often attributed to a lack of team cohesion. Team cohesion is an interesting concept, as it’s much more nebulous than some of its more measurable counterparts like wins, points, and other gauges of on-field performance. But because something is hard to measure is not a reason to overlook it, especially when there is so much belief in its critical importance to team performance.

In 2012, Warner, Bowers and Dixon published an article in the Journal of Sport Management titled Team Dynamics: A Social Network Perspective. Their article advocated for the use of Social Network Analysis (SNA) in addressing and analyzing topics such as team cohesion, leadership emergence, and team dynamics. This followed Quatman and Chelladurai’s (2008) suggestion that SNA was a ‘new and promising research lens’ from which sport management researchers could benefit. While some work has been done in this area (Fransen et al., 2015; Lusher, Robins, & Kremer, 2010; Nixon, 1992; 1993), it still appears to be an under-utilized methodology in our field. According to Wasserman & Faust “From the view of social network analysis, the social environment can be expressed as patterns or regularities in relationships among interacting units” (1994, p.3).

Given the call for more research in this area, the growing interest coaches have in the intangibles of team leadership and team dynamics, and the sophisticated flexibility SNA provides in uncovering both team and individual connections, the current case study assessed both group structure and its influence on individuals amongst a Division I women’s lacrosse team. Wasserman and Faust noted that SNA can “seek to model these relationships to depict the structure of a group. One could then study the impact of this structure on the functioning of the group and/or the influence of this structure on individuals within the group” (1994, p. 9). The current study followed this line of thinking linearly, addressing the following aims:

1. Model the relationship between team members in the areas of leadership, technical skills, interpersonal skills, and energy, to depict the structure of the group.
2. Study the influence of this structure on individuals within the group in terms of on-field performance, formal leadership, and mental states.

Method

This social network design case study utilized a Division I women’s collegiate lacrosse team located on the east coast of the United States. All members of the team completed an identical quantitative survey at the beginning and the end of the season. The survey assessed both group and individual social and task questions from the Group Environment Questionnaire (Carron, Widmeyer, & Brawley, 1985), performance anxiety (Smith, Smoll, Cumming, & Grossbard, 2006), recovery experience (Sonnentag & Fritz, 2007), and performance strategies (Lane, Harwood, Terry, & Karageorghis, 2003). Response rates on the surveys were 100% for both iterations of the survey. In addition, coaches individually assessed each player throughout the season during each practice via ‘effort charts,’ which were compiled for consideration in the analysis.

Data Analysis

SNA is both a theory and a method that will be used to examine the relational ties and general perceptions among the lacrosse players on leadership, interpersonal skills, technical skills, and contagious energy (Wasserman & Faust, 1994). Networks are made up of nodes and edges. In this study, every player constitutes as a node (N=30) while the general player perceptions are the links between them. General perceptions of the four relational ties will be broken
down into three categories (positive, neutral, negative) which will be used as the edges within the network. A positive tie will be recorded if a player receives a rating of 6-7, neutral ties (3-5), and negative tie (1-2) on a 7-point likert-type scale. SNA nodal metrics of degree centrality will be used in the mathematical interpretation of the network. Degree centrality indicates prominent nodes (players) within a network that have the highest influence. Both in-degree (number teammates who indicate they are connected to an individual) and out-degree (number of connections that individual has to others) will allow for interpretation of degree centrality. Players who are most central to the overall functioning of the team will be examined along with descriptive nodal attributes (e.g., formal/informal leaders and starter/non-starter). SNA measure of density will also be used to compare the networks and cohesive structure of the team from pre-season and post-season. Data collection was completed in August, 2017; analysis is currently ongoing and will be complete in November, 2017. All SNA analysis was conducted using Jupyter Notebook and the visual representation of the network was conducted in Gephi 0.9.1.

Results and Discussion
Preliminary results provided the research team with a visual representation of the leadership relationships between teammates. Interestingly, the team exhibited a sense of shared leadership as the network density equaled .29 from the preseason data collection. This value will be compared to the postseason data collection to determine if shared leadership was supported with stronger ties (i.e., increased network density) or weaker ties as the season progressed. Similar analyses will be conducted on technical skills, interpersonal skills, and energy. Furthermore, this data will be compared against on-field performance, formal leadership, and mental states. Overall, these findings should shed light on many of the ‘intangibles’ which many coaches discuss as being instrumental in team success. These findings will collectively be presented and discussed during the 2018 NASSM conference.