Who takes the lead? Social network analysis as a pioneering tool to investigate shared leadership within sports teams

Fransen et al. (2015)
Background Overview

• The paper briefly discusses prior research regarding leadership within teams. This includes business teams, governments, sports teams, etc.

• Parallels are drawn between the different types of teams – essentially, there is usually an appointed formal leader (manager, coach, captain, etc.), a common goal among the team, and distinct outcomes (sale increases, sports victory).
Background Overview

- The author cites their own prior work (2014) in order to establish the idea that sports leadership can be broken down into four roles: Task Leader, Motivational Leader, Social Leader, and External Leader.

- The author also cites several other authors in establishing the concept of an informal leader, which is a group member that is not formally recognized as a leader but still takes on a leadership role.

- Lastly, the author discusses the limitations regarding their prior research – The leadership structure of several sports teams were examined via direct polling of the athletes. However, participants in the study were only asked to comment on the best leader in each role, which left the author with an incomplete leadership structure.
Goals of Fransen et al. 2015

• Perform similar surveys, but in a more in-depth fashion.
  • Investigate several teams, and ask the participants questions regarding the leaders on their team and/or the leadership of other athletes on their team.

• The additional information gathered will allow for the use of different analysis tools.

• The end goal of the additional information and new analysis tools is to gain a deeper insight of the structure of leadership in sports teams. More specifically:
  • The relationships between formal leaders, informal leaders, and coaches.
  • The relationships between the four leadership roles
Structure of Fransen et al. 2015

• The paper draws its data from two similar studies. Both ask the participants to rate their peers in certain categories on a 0 to 4 scale, with 0 being a “very poor leader” and 4 being a “very good leader”.
  • Study 1 asks participants to rate their peers by “general leadership”.
    • This does not ask them to rate them in regards to the specific leadership roles.
  • Study 2 asks participants to rate their peers in regards to each different leadership role.

• Both studies ask the participants to also rate their coaches. Additionally, the designated team captain (the formal leader) is known to the researcher.
Rather than ask participants solely about the best leaders (in each role) on their team, they were asked to rate every other player on their team from 0 to 4.

- The best distinction was a major limitation in earlier research.
- This allowed Fransen to create a weighted directed graph where each athlete was a node and an edge was drawn between two nodes with weight corresponding to how they were rated.
- Additionally, ask participants to rate their coach in a similar fashion.

Since such a graph could now be constructed, Fransen could use social network analysis on it to glean information about the leadership structure of the corresponding team.

That analysis, when done for many teams, let Fransen draw conclusions about the leadership structure of sports teams in general.
Proper Aims of Fransen – Aim 1

In order to use social network analysis to compare the leadership roles of the coach, formal leader, and informal leaders, they relied on
• 1) a complete leadership network and
• 2) the four leadership role classification.

However, that classification was based on a study in which only the best leader in each role was examined, which led to an incomplete leadership network.

Therefore, they took a second look at this classification, this time examining the quality of leadership of all athletes on a team. By performing social network analysis on the data from study 2 (which examines the leadership roles), they can determine whether or not the four role classification holds.

The expectation is that this classification will hold, revealing clearly distinct roles with at most moderate correlation between them.
Proper Aims of Fransen – Aim 2

If the fourfold leadership classification holds, it is then possible to move onto the second aim, which is to examine the usefulness of social network analysis in regards to understanding the leadership structure in sports teams.

By gathering information regarding the leadership quality of all athletes on the team, it is possible to compare the leadership quality of the coach, formal leader, and informal leaders. Previous research only compared portions of the leadership structure, such as coaches to formal leaders, formal leaders to informal leaders, or informal leaders to each other.

The expectation (which is in line with previous studies) is that in at least half the teams, the team captain will not be perceived to be the best athlete leader. This means that we expect the average captain leadership quality to be lower than the quality of the best athlete leader on the team.
Proper Aims of Fransen – Aim 2

We expect that the team captain, despite not being the best leader, will rate higher than the average leadership quality of all players on the team.

We expect that coaches will be perceived to the best leaders on the team, with respect to general leadership (study 1 data).

We expect that coaches will rate as a better task leader than athletes, but that athletes will rate as better motivational and social leaders.
Leadership Role Definitions

- In short, the task leader and motivational leader have shown moderate correlation, as have the social leader and external leader.

Table 1
The definitions of the four leadership roles, as outlined by Fransen et al. (2014).

<table>
<thead>
<tr>
<th>Leadership role</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task leader</td>
<td>A task leader is in charge on the field; this person helps the team to focus on our goals and helps in tactical decision-making. Furthermore the task leader gives his/her teammates tactical advice during the game and adjusts them if necessary.</td>
</tr>
<tr>
<td>Motivational leader</td>
<td>The motivational leader is the biggest motivator on the field; this person can encourage his/her teammates to go to any extreme; this leader also puts fresh heart into players who are discouraged. In short, this leader steers all the emotions on the field in the right direction in order to perform optimally as a team.</td>
</tr>
<tr>
<td>Social leader</td>
<td>The social leader has a leading role besides the field; this person promotes good relations within the team and cares for a good team atmosphere, e.g. in the dressing room, in the cafeteria or on social team activities. Furthermore, this leader helps to deal with conflicts between teammates besides the field. He/she is a good listener and is trusted by his/her teammates.</td>
</tr>
<tr>
<td>External leader</td>
<td>The external leader is the link between our team and the people outside; this leader is the representative of our team toward the club management. If communication is needed with media or sponsors, this person will take the lead. This leader will also communicate the guidelines of the club management to the team regarding club activities for sponsoring.</td>
</tr>
</tbody>
</table>
Characteristics for teams selected for study

- Equal number of teams for each sport.
- Equal number of male and female teams within each sport.
- Equal number of national level teams and provincial/regional level teams within each subgroup.
- Note: Table shows figures for teams who were actually featured in the study.
  - Study 1 began with 35 teams (10 did not meet requirements for a reliable study).
  - Study 2 began with 24 teams, and 3 did not meet certain requirements.

### Table 2
Sample characteristics for Study 1 and Study 2.

<table>
<thead>
<tr>
<th>Sport</th>
<th>Number of participants</th>
<th>M_{team size}</th>
<th>Team gender</th>
<th>Level</th>
<th>M_{age} (years)</th>
<th>M_{experience} (years)</th>
<th>M_{team tenure} (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td>6 teams</td>
<td>16.7</td>
<td>3♂ (n=55)</td>
<td>3 LL (n=58)</td>
<td>23.7 (±4.8)</td>
<td>15.9 (±6.5)</td>
<td>4.4 (±5.2)</td>
</tr>
<tr>
<td>Volleyball</td>
<td>7 teams</td>
<td>10.7</td>
<td>3♂ (n=45)</td>
<td>3 LL (n=42)</td>
<td>28.5 (±11.7)</td>
<td>17.2 (±8.4)</td>
<td>7.2 (±10.2)</td>
</tr>
<tr>
<td>Basketball</td>
<td>6 teams</td>
<td>10.5</td>
<td>4♂ (n=43)</td>
<td>3 LL (n=30)</td>
<td>24.4 (±5.8)</td>
<td>15.7 (±6.4)</td>
<td>6.7 (±6.0)</td>
</tr>
<tr>
<td>Handball</td>
<td>6 teams</td>
<td>11.7</td>
<td>2♀ (n=20)</td>
<td>3 LL (n=33)</td>
<td>23.3 (±5.8)</td>
<td>14.0 (±4.8)</td>
<td>8.7 (±6.1)</td>
</tr>
<tr>
<td>Total</td>
<td>25 teams</td>
<td>12.3</td>
<td>15♂ (n=188)</td>
<td>3 LL (n=28)</td>
<td>24.9 (±4.8)</td>
<td>15.7 (±7.0)</td>
<td>6.5 (±7.2)</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td>7 teams</td>
<td>13.9</td>
<td>4♂ (n=53)</td>
<td>4 LL (n=51)</td>
<td>24.6 (±6.1)</td>
<td>16.8 (±2.3)</td>
<td>2.8 (±2.3)</td>
</tr>
<tr>
<td>Volleyball</td>
<td>8 teams</td>
<td>11.6</td>
<td>3♀ (n=44)</td>
<td>4 LL (n=46)</td>
<td>25.6 (±6.7)</td>
<td>14.4 (±2.8)</td>
<td>3.4 (±2.8)</td>
</tr>
<tr>
<td>Basketball</td>
<td>6 teams</td>
<td>12.8</td>
<td>4♂ (n=43)</td>
<td>4 LL (n=45)</td>
<td>22.7 (±5.5)</td>
<td>13.9 (±2.8)</td>
<td>5.1 (±2.8)</td>
</tr>
<tr>
<td>Handball</td>
<td>6 teams</td>
<td>12.7</td>
<td>3♀ (n=37)</td>
<td>4 LL (n=50)</td>
<td>24.3 (±4.2)</td>
<td>14.9 (±4.9)</td>
<td>3.7 (±4.5)</td>
</tr>
<tr>
<td>Total</td>
<td>21 teams</td>
<td>12.7</td>
<td>11♂ (n=140)</td>
<td>4 LL (n=149)</td>
<td>24.3 (±4.9)</td>
<td>14.9 (±5.8)</td>
<td>3.7 (±3.4)</td>
</tr>
</tbody>
</table>

Note. The standard deviation of age and experience is presented between parentheses. ♂ = male team; ♀ = female team; HL = high level; LL = low level.
Leadership
Quality Network

Task Leadership

- The size of a node is based on the indegree centrality of that node (for that role).
  - It takes into account all edges, including the ones not shown in the figure.
- A higher indegree centrality also corresponds to a more central position in the network.
- The figures only show an edge where a player was given a rating of "4".
- The nodes of the formal leaders (coach and captain), along with the informal leader (node with highest indegree centrality for this role) are colored in.
Leadership Quality Network

Social Leadership

- The size of a node is based on the indegree centrality of that node (for that role).
  - It takes into account all edges, including the ones not shown in the figure.
- A higher indegree centrality also corresponds to a more central position in the network.
- The figures only show an edge where a player was given a rating of “4”.
- The nodes of the formal leaders (coach and captain), along with the informal leader (node with highest indegree centrality for this role) are colored in.
Leadership Quality Network

All-Around Leadership

- The size of a node is based on the indegree centrality of that node (for that role).
  - It takes into account all edges, including the ones not shown in the figure.
- A higher indegree centrality also corresponds to a more central position in the network.
- An edge in this graph represents an average score of 3 or higher.
- The nodes of the formal leaders (coach and captain) along with the informal leaders are colored in.
Data Analysis

• Quadratic Assignment Procedure (QAP) hypothesis tests were used to examine the relation between the different networks. These tests help solve the problem of auto-correlation, which is present in network data.

• The goal of this analysis was to look at how the edges in different leadership quality networks are related to each other. A high QAP correlation between the motivational network and the task network for a specific team would imply that the athletes who are good motivational leaders are also good task leaders.
Data for Aim 1

- The data shows moderate correlations. This implies that while there is some correlation, the four leadership roles are mostly distinct. This confirms the first aim.
- The highest correlation was between Task and motivational leadership.
- The second highest correlation was between the motivational and social leadership.
- These results held true for all sports, genders, and competition levels within the study.

Table 3
The QAP-correlations between the different leadership quality networks, averaged over all teams.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Task leadership quality</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Motivational leadership quality</td>
<td>.67 (SD = .16)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Social leadership quality</td>
<td>.53 (SD = .14)</td>
<td>.60 (SD = .15)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4. External leadership quality</td>
<td>.44 (SD = .20)</td>
<td>.46 (SD = .23)</td>
<td>.43 (SD = .25)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Standard deviations are presented between parentheses.
Data for Aim 2

- The data shows that the formal leader (captain) is not always the best athlete leader. In 14 of the 25 teams, an informal leader was perceived as a better leader.
- The data shows that the formal leader was rated significantly better than the average player on their team. In 21 of the 25 teams, the captain was in the top 3 for general leadership.
- However, the data showed that the best athlete leader was perceived as better leader than the coach. In only 8 of the 25 teams was a coach perceived to be a better leader than the best athlete leader.

Table 4
The average indegree centrality scores for the players and more specifically for the team captain and the best athlete leader, as well as for the coach.

<table>
<thead>
<tr>
<th></th>
<th>All players</th>
<th>Team captain</th>
<th>Athlete leader</th>
<th>Coach</th>
</tr>
</thead>
<tbody>
<tr>
<td>General leadership quality</td>
<td>1.92 ± .22</td>
<td>3.11 ± .49 (2.3)</td>
<td>3.37 ± .34</td>
<td>2.99 ± .74</td>
</tr>
<tr>
<td>Task leadership quality</td>
<td>2.12 ± .38</td>
<td>3.11 ± .67 (2.3)</td>
<td>3.41 ± .46</td>
<td>3.52 ± .29</td>
</tr>
<tr>
<td>Motivational leadership quality</td>
<td>2.34 ± .28</td>
<td>3.12 ± .58 (2.7)</td>
<td>3.45 ± .34</td>
<td>3.21 ± .45</td>
</tr>
<tr>
<td>Social leadership quality</td>
<td>2.44 ± .22</td>
<td>2.97 ± .60 (3.6)</td>
<td>3.50 ± .22</td>
<td>2.54 ± .87</td>
</tr>
<tr>
<td>External leadership quality</td>
<td>1.80 ± .53</td>
<td>2.70 ± .88 (2.4)</td>
<td>3.00 ± .76</td>
<td>3.09 ± .47</td>
</tr>
<tr>
<td>All-round leadership quality</td>
<td>2.16 ± .28</td>
<td>2.97 ± .61 (2.4)</td>
<td>3.22 ± .41</td>
<td>3.09 ± .41</td>
</tr>
</tbody>
</table>

Note. For the team captain, the average athlete leadership rank is presented in parentheses.
- These analyses are based on Study 1.
- These analyses are based on Study 2.
- The athlete leader is defined as the player who is perceived on average as best leader by his/her teammates on the specific leadership role.
Conclusions of Fransen et al.

• The fourfold leadership classification model seems to hold well even when taking into account the full leadership network. Fransen discusses some possible explanations behind the high correlations for task and motivation leaders, and social and motivation leaders.
  • Task/Motivation: playing time was an attribute of highly rated task leaders and motivational leaders.
  • Social/Motivation: Both roles refer to interpersonal relations, so good personal skills are needed in both roles.

• Half the teams had an informal leader that was rated as a better all-around leader than the team captain.
  • This was especially true for the motivational and social tasks.

• In 83% of the teams in the study, the captain is one of the top 3 general or all-around leader.

• The coach was only perceived to be the best leader in about 35% of teams.
Conclusions of Fransen et al.

• High School sports coaches frequently cite leadership as a problem. Network analysis may help coaches identify key leaders on the team.
  • This would allow coaches to devote more resources to developing those athletes leadership skills.
  • It would also allow coaches to know that those leaders may need assistance.

• Network analysis may also reveal the presence of (social) cliques – if half the team perceives one athlete as the best task leader, and the other half perceives a different athlete as the best task leader, there is likely a divide in the network.

• Lots of information can be gathered from leadership network analysis. And knowledge is power! This information could be used by coaches, sports psychologists, parents, etc.

• The final conclusion is “that the era of one sole leader (i.e., the coach as leader) has come to an end. Instead, sports teams are complex social systems characterized by shared leadership.”
Areas for future research

• Future research could explore different age ranges
  • Current study examined young adults (ages 16-31)

• Research could also be done on a team over time.
  • It could examine the stability of different leadership structures over time.
  • It could examine how the roles of each athlete change over time.

• This paper suggests a shift in the traditional leadership view (that the coach is the primary leader) towards the idea of shared leadership (in which not only the team captain, but informal leaders, take the lead). This idea could be expanded or investigated further.
Personal conclusions and thoughts

• The title is misleading – it makes it seem like it analyzes social networks to investigate shared leadership, when it really uses social network analysis tools to investigate shared leadership.

• The paper does not seem to make much of a claim other than to reinforce the author’s prior work, but extended to a full leadership network. The shared leadership model was already shown in the work that examines the best leader in each role.

• The author makes bold claims about the distinctiveness of roles based on the QAP-correlations. However, in order for an athlete to have a high general-leadership score, they have to score highly for multiple roles, suggesting that they are not distinct.
  • Perhaps this claim is examined more in Fransen’s 2014 work.

• Lastly, the author completely ignores the real-world situation regarding formal leadership in sports teams and how it affects the perception of those leaders. For example, team captain is generally a highly coveted position. Strong leaders who do not end up as team captains may harbor some resentment towards the formal leader, negatively impacting the captain’s score.
  • There are many other factors similar to the above that impact perceptions but are not taken into account.