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

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ABSTRACT

Leaders do not operate in social vacuums, but are imbedded in a web of interpersonal relationships with their teammates and coach. The present manuscript is the first to use social network analysis to provide more insight in the leadership structure within sports teams. Two studies were conducted, including respectively 25 teams ($N = 308$; $M_{age} = 24.9$ years old) and 21 teams ($N = 267$; $M_{age} = 24.3$ years old). The reliability of a fourfold athlete leadership categorization (task, motivational, social, external leader) was established by analyzing leadership networks, which mapped the complete leadership structure within a team. The study findings highlight the existence of shared leadership in sports teams. More specifically, regarding the task and external leadership roles, no significant differences were observed between the leadership quality of coaches and athlete leaders. However, athlete leaders were perceived as better motivational and social leaders than their coaches. Furthermore, both the team captain and informal athlete leaders shared the lead on the different leadership roles. Social network analysis was found to be a pioneering but valuable tool for obtaining a deeper insight in the leadership structure within sports teams.

1. Introduction

High-quality leadership has been considered as a decisive factor in the successes of governments, political movements, educational institutions, business enterprises, and sports teams (Chelladurai, 2012). The majority of the research on team leadership has focused narrowly on the influence and behavior of one single team leader (usually a manager external to the team), thereby largely ignoring the leadership provided by team members. Only since the last decade, the concept of shared leadership was introduced in organizational settings and has been defined as "leadership that emanates from the members of teams and not simply from the appointed team leader" (Pearce and Sims, 2002, p. 172). The idea that "shared leadership is a more useful predictor of team effectiveness than vertical leadership" (Pearce and Sims, 2002, p. 183) seems to be at the heart of the growing interest in shared forms of organizational leadership (Pearce and Conger, 2003).

The structure of a sports team is similar to the structure of a business team. Both teams are characterized by a hierarchical structure in which there is one person formally appointed as the leader of the team (i.e., respectively the manager or the coach). Furthermore, both types of teams strive for visible performance outcomes, for instance, taking the form of sale increases or a sports victory. Therefore, it should not be surprising that there are also similarities between the leadership styles of business managers and sport coaches (Weinberg and McDermott, 2002). In line with organizational leadership research, the vast majority of the research on leadership in sports settings has concentrated on the role of the coach. In this regard, a wide range of outcomes has been linked to coaches' leadership styles and behaviors, ranging from athletes' motivation to athletes' performance (for reviews see Amorose, 2007; Chelladurai, 2007; Gould and Wright, 2012; Horn, 2008; Langan et al., 2013).

While coaches are vital to their teams, another source of leadership within teams has recently garnered research attention;

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namely athlete leadership. Athlete leaders have been characterized by more central positions on the field compared with their teammates, a longer playing time, a higher task competence, a longer team tenure, and a stronger social connectedness with teammates (Fransen et al., 2015c; Loughead et al., 2006; Moran and Weiss, 2006; Price and Weiss, 2011; Rees and Segal, 1984; Yukelson et al., 1983). Furthermore, a positive relationship was demonstrated between the presence of athlete leaders and team outcomes, such as athletes' satisfaction, athletes' team confidence, the team's cohesion, and the team's performance (Crozier et al., 2013; Fransen et al., 2012, 2015a,b,d; Price and Weiss, 2011; Vincer and Loughead, 2010). These findings highlight the crucial role of having high-quality athlete leaders and necessitate further research efforts to obtain a deeper insight in athlete leadership.

Loughead et al. (2006, p. 144) defined an athlete leader as "an athlete occupying a formal or informal leadership role influencing team members toward a common goal." Contained within this definition are two types of leaders. Athletes who are formally appointed to be a leader, such as the team captain, are termed formal leaders. Informal leaders on the other hand are not formally recognized as a leader but acquire their leadership role through group member interactions. Previous studies on athlete leadership have mainly focused on the team captain as formal leader (e.g., Dupuis et al., 2006; Grandzol et al., 2010; Kent and Todd, 2004; Voelker et al., 2011). Nevertheless, several researchers have argued that, besides the team captain as formal leader of the team, informal leadership should also be taken into consideration (Cope et al., 2011). For example, Loughead et al. (2006) revealed that, although most athlete leaders occupy a formal leadership position (i.e., captain or assistant captain), also other players within the team are perceived as leaders by their teammates. In a different study, the majority of athletes (65.1%) pointed out that both the team captain and other players occupied a leadership function in their team (Loughead and Hardy, 2005).

In addition to the formal-informal leadership distinction, Fransen et al. (2014) recently identified the presence of four different athlete leadership roles. This new athlete leadership categorization encompasses two on-field leadership roles (task and motivational leader) and two off-field leadership roles (social and external leader). A detailed description of these four different leadership roles, as outlined in previous research (Fransen et al., 2014), can be found in Table 1. Using this new categorization of athlete leadership roles, Fransen et al. (2014) focused on the players who were perceived as the best leader with respect to these four leadership roles. Interestingly, the results indicated that there was some overlap between the task and motivational leadership role. More specifically, 18.8% of the best task leaders were also perceived as the best motivational leaders in their team. Furthermore, 11.5% of the best motivational leaders were also seen as the best social leaders. However, these overlapping percentages were relatively low, supporting the fact that the four leadership roles are clearly distinct and, more importantly, showing that different players within the team are perceived as best leader on the four leadership roles.

Furthermore, Fransen et al. (2014) examined the formal and informal athlete leaders with respect to the four leadership roles (i.e., task, motivational, social, and external) within nine different team sports in Flanders ($N = 4451$). The results demonstrated that only 1% of the participants perceived their team captain (i.e., a formal leader) as the best leader in all four roles. Even more remarkable was that almost half of the participants (44%) did not perceive their captain as the best leader on any of the four roles, neither on the field, nor off the field. On average over the four leadership roles, 29.5% of the participants indicated their captain as the best leader on a specific leadership role, whereas 70.5% of the participants indicated an informal leader. These results show that athlete leadership is shared among different team members, thereby contradicting the general notion of players and coaches that the team captain is the only leader of the team. As a consequence, there is a clear need for a better understanding how widespread athlete leadership is within teams.

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

Leadership role	Definition
Task leader	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.
Motivational leader	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.
Social leader	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.
External leader	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.

One limitation emerging from Fransen et al. (2014) was that participants were only asked to evaluate the *best* leader on their team. As such, the authors obtained important information concerning the *best* leader on the team, concerning the overlap between the *best* leaders in the different leadership roles, and concerning whether the team captain is perceived as *best* leader. However, information on the leadership provided by other team members, who may not be the best but still influential leaders, is missing. Furthermore, because perceived leadership of the coach was not measured, it was not possible to compare the athlete leaders and the coach in this respect. As such, the leadership structure within the complete team remains concealed. Consequently, it cannot be ruled out that the captain, not often perceived as the best leader in the Fransen et al. (2014) study, was neither perceived as second or third best leader. Likewise, it could be that, although the captain was not perceived as best leader in any of the given roles, he/she might have been perceived as best all-round leader (i.e., scoring second or third best on all four leadership roles).

In order to gain a deeper insight into the leadership structure of sports teams, the present study will measure the leadership quality of the coach and of every player on the team with respect to the four different leadership roles. Moreover, it is important to realize that athlete leaders do not lead in a social vacuum, but instead, are imbedded in a web of interpersonal relationships with their teammates and coach. Nevertheless, previous research has typically focused on individual perceptions when examining athlete leadership, thereby ignoring the surrounding team context. The present study will extend previous research by using social network analysis to obtain a greater insight in the complete leadership structure within sports teams.

1.1. Social network analysis

Social network analysis is a set of methodological tools for understanding the relationships and structures within a network. This approach views social relationships in terms of network

theory, consisting of nodes, representing the individual actors within the network, and ties, representing the relationships between the individuals (Wasserman and Faust, 1994). Over the past decade, the theory of networks yielded explanations for social phenomena in a wide variety of areas, ranging from organizational networks and information sharing, over the use of social media, to politics and terrorist networks (Borgatti et al., 2009).

Recently, social network analysis has also been established as a well-suited technique to study leadership in organizational settings for three reasons: (1) it can model patterns of relationships among interconnected individuals; (2) it can represent how leadership is distributed among group members; and (3) it can identify the emergence of multiple leaders (Emery et al., 2013). In this regard, Emery et al. (2013) used social network analysis to investigate the emergence of leaders in a newly-formed leaderless group. Also Hoppe and Reinelt (2010) postulated different leadership networks as a useful framework to identify important outcomes such as collaboration and information sharing. It is important to note that the ties in such an organizational leadership network are often informal and exist outside the formal organizational structure, such as when an employee seeks advice from a colleague other than the manager to solve a problem more quickly. This informal leadership closely aligns with the informal athlete leadership in sports settings.

Although social network analysis has emerged as a useful technique in other research disciplines, this network approach has hardly found its way into sports research (Lusher et al., 2010). That is unfortunate because, as Lusher et al. (2010) noted, sports teams are ideally suited for a social network investigation because they are composed of a well-defined group of interdependent individuals (or stated in social network terms 'a full network'). Furthermore, a sports team has clear and measurable performance outcomes, and the effectiveness of the relationships between the players has a direct impact on those outcomes.

Although Nixon (1993) argued that social network analysis could provide important insights in the leadership structure of sports teams, the few studies that used social network analysis in sports settings only focused on the cognitive or actual interaction between the players during the game (Bourbousson et al., 2010; Cotta et al., 2013; Passos et al., 2011). To our knowledge, there is only one study that took a first step in the direction proposed by Nixon. More specifically, Lusher et al. (2010) constructed an influence network of an Australian football team by asking each of the players which teammate they considered as influential. Unfortunately, the network used in this study did not provide any information on the strength of these influence perceptions. The results simply revealed that most players rated the best players in their team as influential, but these findings did not reveal any information on the degree of influence these players were perceived to have.

1.2. The present study

The present manuscript, which includes two studies, aims to extend the current athlete leadership literature by demonstrating that social network analysis is a useful tool to examine leadership in sports teams. Therefore, the present studies used networks of leadership perceptions in which the nodes represent the team members and the ties are determined by the strength of the perceived leadership quality. This network approach constitutes a novel approach to examine leadership in sports teams. Although social network analysis has already been used to study leadership in education and work team settings (Emery et al., 2013; Mehra et al., 2006), the specific network approach that is used in the current manuscript extends these studies in two ways. First, the present research does not use binary networks (relations represented by 0 '*no leader*' or 1 '*a leader*'), but instead valued networks, in which the strength of the ties represents the athlete leadership quality, ranging from 0 (*very poor leader*) to 4 (*very good leader*). As such, high-quality leaders can be identified as the persons who receive the strongest ties. In addition, we do not only examine the general athlete leadership of team members (Study 1), as was the case in previous research. Instead, Study 2 goes more in depth and investigates the leadership structure within each team for the four different roles (i.e., task, motivational, social, and external leadership role). This role-based leadership approach is suggested to provide a more comprehensive view on the complete leadership network. Consequently, two aims can be distinguished in the present manuscript.

1.2.1. Aim 1 – The reliability of the fourfold athlete leadership categorization for networks

To compare the leadership roles of the coach, the team captain, and the informal athlete leaders, we rely on the fourfold leadership classification developed by Fransen et al. (2014). As we noted above, this classification was based on perceptions of the *best* leader on each leadership role. Because social network analysis takes into account the leadership structure of all players in the team, we should establish in a first step whether the previous classification still holds for the leadership network structure. Performing social network analysis on the data of Study 2 (role-specific leadership quality) allows us to examine the correlations between all four leadership networks for all players within the team. In other words, not only the *best* leaders will be compared, as was the case in the study of Fransen et al. (2014), but also the moderate leaders and the players who do not occupy a leadership function at all. With a network approach, it can then be established whether a person with high or low athlete leadership quality on one leadership role, also scores respectively high or low on another leadership role. It is only in this way that we can examine whether the four roles are really distinct leadership roles or whether leadership qualities can be generalized over different roles. In line with previous research, we expect only moderate correlations between the different leadership networks, indicating that the roles are clearly distinct roles and mainly fulfilled by different players within the team (H1).

1.2.2. Aim 2 – Comparing coach leadership with formal and informal athlete leadership

In a second step, the main purpose of the study can then be realized, namely establishing the usefulness of social network analysis as a novel approach to better understand the leadership structure in sports teams. Previous research only focused on a part of the leadership structure in sports teams, for example, on the difference between the coach and athlete leaders (e.g., Loughead and Hardy, 2005; Price and Weiss, 2013), on the difference between the team captain as formal leader and the informal athlete leaders (e.g., Fransen et al., 2014; Holmes et al., 2010), or on the different types of informal athlete leaders (e.g., Eys et al., 2007; Fransen et al., 2014; Loughead et al., 2006). In the present study, we compare the leadership quality of the coach with the leadership quality of both formal and informal athlete leaders within the team, in general (Study 1) and on the four leadership roles (Study 2).

In line with previous studies (Fransen et al., 2014; Loughead and Hardy, 2005; Loughead et al., 2006), we expect that in at least half of the teams, the team captain will not be perceived as best athlete leader. As such, we expect that the average captain's leadership quality, as rated by their teammates, will be lower than the perceived quality of the best athlete leader in the team (H2a), both in general (Study 1) and on the four leadership roles (Study 2). Nevertheless, even though the team captain might not be perceived as the best leader, we do expect that the leadership quality of the team captain will be rated higher in general (Study 1) and on all four different leadership roles (Study 2) than the average leadership quality of all the players in the team (H2b).

Furthermore, this network approach allows us to compare the leadership quality of athlete leaders and coaches. Because most coaches have completed a coach education program, and given the hierarchical structure in sports teams characterized by the coach as formal leader, we expect that the coaches will be perceived as the best leaders in the team, with respect to general leadership quality (H3a; data of Study 1). With regard to the different roles, previous research that compared coach and athlete leadership in sports teams showed that athlete leadership was more strongly related to social cohesion than coach leadership (Price and Weiss, 2013). Moreover, both coach and athlete leadership were found to be equally important for task cohesion. Furthermore, coaches displayed behaviors aimed at training and instruction (i.e., characteristic behavior for task leaders) more frequently than athlete leaders. By contrast, athlete leaders exhibited more positive feedback and social support than their coaches, which are characteristic behaviors for motivational and social leaders (Loughead and Hardy, 2005). Therefore, we expect that the coach will be perceived as a better leader than athlete leaders on the task leadership role (H3b; data of Study 2). On the other hand, we expect that athlete leaders will outperform the coach on the motivational and social leadership roles (H3c; data of Study 2).

2. Method

2.1. Procedure

In total, 71 coaches were invited via email to participate in our study. The 59 coaches who agreed to participate (yielding a response rate of 83%) were asked to send us the player list for the current season. We adopted a stratified sampling technique with respect to sport, gender, and playing level to constitute our sample in both studies. As such, an equal number of teams of the different sports were selected (i.e., soccer, volleyball, basketball, and handball in Study 1; soccer, volleyball, and basketball in Study 2). Within each sport, an equal number of male and female teams participated. Moreover, within each subgroup, half of the teams played at high level (i.e., national level) and half of the teams played at low level (i.e., provincial or regional level).

At the end of a training session, a research assistant was present to inform the players about the nature of the study and to answer any questions participants may have had during the completion of the questionnaire. The APA ethical standards were followed in the conduct of the study and players could withhold their participation at any time. Informed consent was obtained from all participants and confidentiality was guaranteed. No rewards were given for participation in the study.

2.2. Participants

2.2.1. Study 1

In total, 35 sports teams participated in Study 1 (eight volleyball teams, eight soccer teams, eight basketball teams, and 11 handball teams). To conduct reliable social network analyses, a high response rate within each participating team is required (Sparrowe et al., 2001; Wasserman and Faust, 1994). In 10 teams several players did not attend the training session in which this research study was conducted, and as a consequence, the minimum required response rate of 75% was not attained in these teams (Smith and Moody, 2013). Therefore, these 10 teams were removed from our dataset. The 25 remaining teams included 15 male teams and 10 female teams. The participants were on average 24.9 years old and had 15.7 years of experience in their sport. More detailed information on the participants can be found in Table 2.

2.2.2. Study 2

In total, 24 sports teams participated in Study 2 (eight soccer teams, eight volleyball teams, and eight basketball teams). There was no overlap between the samples of Study 1 and Study 2. Based on the cut-off of 75% for the response rate per team, three teams were removed from our dataset. The 21 remaining teams included 11 male teams and 10 female teams. The participants were on average 24.3 years old and had 14.9 years of experience in their sport. More detailed information on the participants is presented in Table 2.

2.3. Measurements

2.3.1. Study 1 – General leadership quality

Each participant had to indicate "to what extent they considered each player as having good general leadership qualities" on a 5-point Likert scale, ranging from 0 (*very poor leader*) to 4 (*very*

Table 2
Sample characteristics for Study 1 and Study 2.

Sport	Number of participants	$M_{Team\ size}$	Team gender	Level	M_{Age} (years)	$M_{Experience}$ (years)	$M_{Team\ tenure}$ (years)
Study 1							
Soccer	6 teams (n = 100)	16.7	3 ♂ (n = 55) 3 ♀ (n = 45)	3 HL (n = 58) 3 LL (n = 42)	23.7 (±4.8)	15.9 (±6.5)	4.4 (±5.2)
Volleyball	7 teams (n = 75)	10.7	4 ♂ (n = 43) 3 ♀ (n = 32)	4 HL (n = 45) 3 LL (n = 30)	28.5 (±11.7)	17.2 (±9.4)	7.2 (±10.2)
Basketball	6 teams (n = 63)	10.5	4 ♂ (n = 43) 2 ♀ (n = 20)	3 HL (n = 30) 3 LL (n = 33)	24.4 (±5.8)	15.7 (±6.4)	6.7 (±6.0)
Handball	6 teams (n = 70)	11.7	4 ♂ (n = 47) 2 ♀ (n = 23)	3 HL (n = 42) 3 LL (n = 28)	23.2 (± 4.8)	14.0 (±4.8)	8.7 (±6.1)
Total	25 teams (n = 308)	12.3	15♂ (n = 188) 10♀ (n = 120)	13 HL (n = 175) 12 LL (n = 133)	24.9 (±7.5)	15.7 (±7.0)	6.5 (±7.2)
Study 2							
Soccer	7 teams (n = 97)	13.9	4 ♂ (n = 53) 3 ♀ (n = 44)	4 HL (n = 51) 3 LL (n = 46)	24.6 (±4.4)	16.1 (±6.7)	2.8 (±2.3)
Volleyball	8 teams (n = 93)	11.6	4 ♂ (n = 50) 4 ♀ (n = 43)	4 HL (n = 48) 4 LL (n = 45)	25.6 (±5.5)	14.4 (±5.2)	3.4 (±2.8)
Basketball	6 teams (n = 77)	12.8	3 ♂ (n = 37) 3 ♀ (n = 40)	4 HL (n = 50) 2 LL (n = 27)	22.7 (±4.2)	13.9 (±4.9)	5.1 (±4.5)
Total	21 teams (n = 267)	12.7	11♂ (n = 140) 10♀ (n = 127)	12 HL (n = 149) 9 LL (n = 118)	24.3 (±4.9)	14.9 (±5.8)	3.7 (±3.4)

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

good leader). Based on the player list, all the names of the players on the team were listed in advance, as was suggested by Lusher et al. (2010). For each team, this resulted in an $N \times N$ being the number of team members). The first row indicates the outgoing ties of the first team member (i.e., the leadership quality of every team member as perceived by the first team member), while the second row indicates the second team member's leadership quality perceptions, and so on. The columns reflect the incoming ties to team members, with the first column being the ratings of all team members with regard to the leadership quality of the first player. This means that the AB entry not necessarily equals the BA entry. In other words, person A can perceive person B as a good leader, but person B does not necessarily perceive person A as a good leader. This adjacency matrix thus refers to a non-symmetric, finite $N \times N$ social network with directed relations that refer to the rating of general leadership quality that team members gave each other. By convention, the diagonal entries are forced to be missing values, representing that players do not rate their own leadership quality. In addition, each player rated the general leadership quality of their coach, also on a 5-point Likert scale, ranging from 0 (*very poor leader*) to 4 (*very good leader*).

2.3.2. Study 2 – Role-specific leadership quality

To construct role-specific leadership quality networks, each of the participants had to rate the leadership quality of each of their teammates and their coach on four different leadership roles: task leader, motivational leader, social leader, and external leader. The same procedure was used as to construct the general leadership network in Study 1. For example for the task leadership network, the definition of a task leader, as outlined in Table 1, was presented to the participants. Subsequently, each participant had to rate the quality of the task leadership of each of his/her teammates, whose names were listed in advance. Players had to indicate for each of their teammates "how well they perceived their teammates' task leadership qualities" on a 5-point Likert scale, ranging from 0 (*very poor task leader*) to 4 (*very good task leader*). This procedure resulted in a finite $N \times N$ task leadership quality network for each team. This network had directed relations, referring to the rating of task leadership quality that team members gave each other. In addition, each player rated the task leadership quality of their coach on the same response scale. The same procedure was adopted for the other leadership roles, so that for every team four role-specific leadership networks were created: a task leadership network, a motivational leadership network, a social leadership network, and an external leadership network.

2.4. Data Analysis

Degree centrality is an often used social network measure to study leadership in teams (Carson et al., 2007). In our study, we used a valued network approach, in which the ratings vary within a given range (in our study between '0' and '4'). The degree centrality thereby refers to the strength of a node's ties. In directed networks, like the networks in our study, centrality can be further differentiated into indegree centrality (i.e., the strength of the incoming ties) and outdegree centrality (i.e., the strength of the outgoing ties). For the examination of leadership networks, it has been recommended to use indegree centrality: an athlete's leadership quality as perceived by his/her teammates. This measure assesses a leader's importance in the network and his/her influence on the other team members (Freeman, 1979; Hoppe and Reinelt, 2010; Sutanto et al., 2011). In our leadership networks, a node with a high indegree centrality refers to a player that is, on average, seen as a good leader by his/her teammates.

To examine the relation between the different types of networks, we performed the social network-specific Quadratic Assignment Procedure (QAP) hypothesis tests (Krackhardt, 1988). The autocorrelated structure of network data (Wasserman and Faust, 1994) can lead to severe biases when classical hypothesis tests are performed (Krackhardt, 1987). Therefore, QAP-tests use restricted permutation tests, which makes them robust against the problem of autocorrelation (Dekker et al., 2007). More specifically, QAP-correlations were calculated between the different leadership quality networks for each team separately. The goal of this analysis was to examine the degree in which the ties in the different leadership quality networks are related with each other. For example, a high QAP-correlation between the task leadership quality network and the motivational leadership quality network in a certain team means that the athletes who are perceived as high-quality task leaders are also perceived as high-quality motivational leaders. Moreover, the low-quality task leaders are also perceived as low-quality motivational leaders.

3. Results

3.1. The different leadership networks

To test the reliability of the existing athlete leadership classification (Fransen et al., 2014) for the use of network analysis, we created a separate leadership quality network for each of the four leadership roles (task, motivational, social, and external leadership role). As an illustration, Fig. 1 presents the task leadership quality network of one of the participating teams: a male volleyball team. Fig. 2 presents the social leadership quality network within the same team. To maintain clarity of the figures, we decided to visualize only the strongest leadership perceptions or, in other words, the perceptions of very good leadership (i.e., score of 4). The size of each node corresponds to the player's leadership quality in fulfilling that particular leadership role (i.e., the player's indegree centrality). The node size does take into account all the arrows, also the ones with scores lower than 4 that are not visualized in the picture. The more a player is perceived as a good leader by his/her teammates, the larger the corresponding node size, and the more central the node is positioned in the network. Because we did not ask the coach to

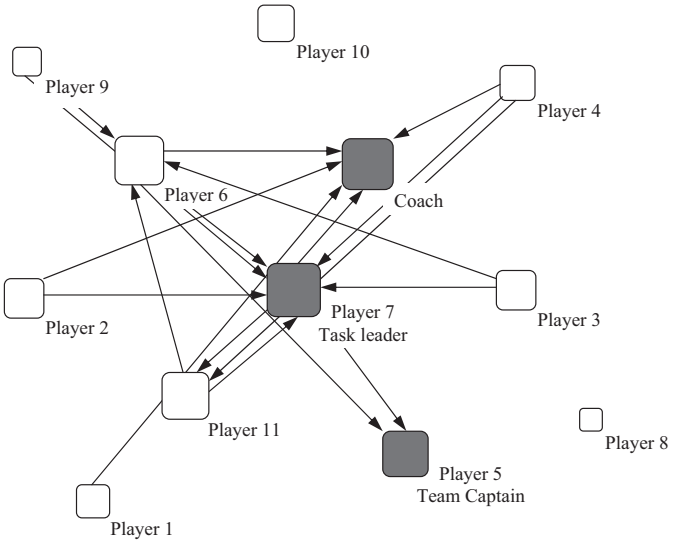

Fig. 1. Task leadership quality network of a participating team. A directed line from Player A to Player B means that Player A perceives Player B as a very good task leader (i.e., score of 4). The other scores are not visualized. The node size corresponds to the indegree centrality: the higher a player's task leadership quality as perceived by the other team members, the larger the corresponding node, and the more central the player is positioned in the figure. The nodes of the formal leaders and the informal task leader are filled.

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

	1	2	3	4
1. Task leadership quality	1			
2. Motivational leadership quality	.67 (*SD* = .16)	1		
3. Social leadership quality	.53 (*SD* = .14)	.60 (*SD* = .15)	1	
4. External leadership quality	.44 (*SD* = .20)	.46 (*SD* = .23)	.43 (*SD* = .25)	1

Note. Standard deviations are presented between parentheses.

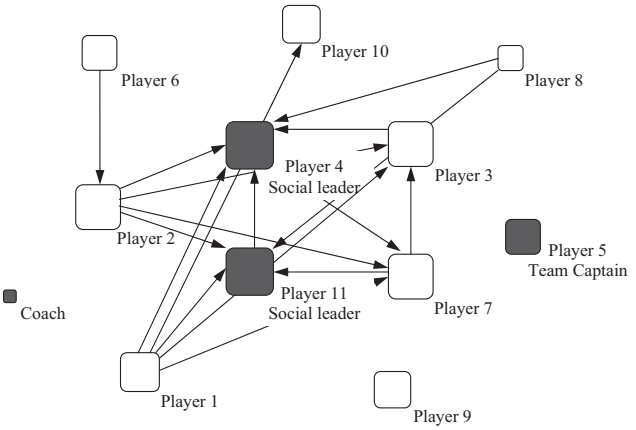

Fig. 2. Social leadership quality network of a participating team. A directed line from Player A to Player B means that Player A perceives Player B as a very good social leader (i.e., score of 4). The other scores are not visualized. The node size corresponds to the indegree centrality: the higher a player's social leadership quality as perceived by the other team members, the larger the corresponding node, and the more central the player is positioned in the figure. The nodes of the formal leaders and the two informal social leaders are filled.

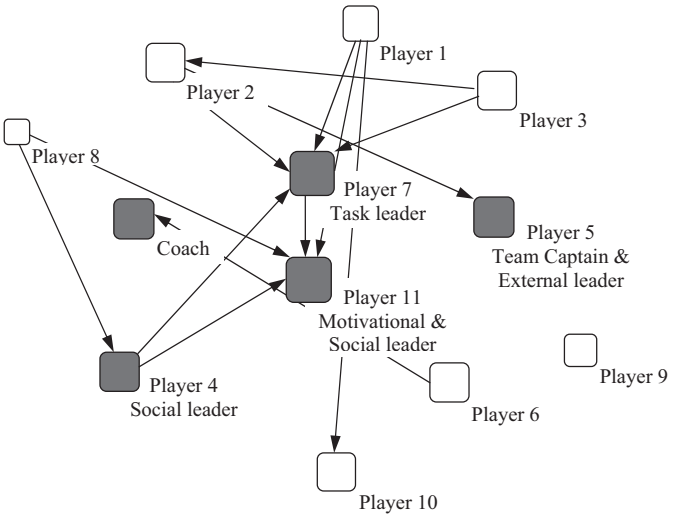

Fig. 3. All-round leadership quality network of a participating team. A directed line from Player A to Player B means that, averaged over all four leadership roles, Player A rated Player B as a good leader (i.e., average score of 3 or higher). The other scores are not visualized. The node size corresponds to the average indegree centrality of the four roles: the higher a player's all-round leadership quality as perceived by the other team members, the larger the corresponding node, and the more central the player is positioned in the figure. The nodes of the formal and informal leaders on each leadership role are filled.

rate the players' leadership quality, there are no out-going arrows from the coach's node.

For instance, Fig. 1 reveals that in this particular volleyball team player 7 is perceived as the best task leader. Both coach and team captain are also perceived as relatively important task leaders, indicated by their central position in the network and their relatively large node size. In Fig. 2, both player 4 and player 11 have the same indegree centrality scores and thus share the lead as the two individuals who provide the highest quality of social leadership. In this figure, the formal leaders (i.e., the coach and the team captain) are both positioned on the outside of the network, meaning that the social leadership role is clearly fulfilled by the informal leaders on this team.

Fig. 3 represents the all-round leadership quality network of the same team as in Figs. 1 and 2. The perceived all-round leadership quality is the average of the perceived leadership quality scores on the four leadership roles (task, motivational, social, and external). The visualization in Fig. 3 only includes the arrows indicating an average score of 3 or higher (i.e., perception of a good or very good all-round leader). In this network, the node size (and the position centrality in the network) corresponds to players' indegree centrality of all-round leadership quality. The nodes of both formal and informal leaders are filled. In this team, the informal leaders (player 7 and player 11) are positioned most central in the network, and thus are perceived as the best all-round leaders. However, it should be noted that the coach and team captain also occupy relatively central positions.

3.2. Aim 1 – The reliability of the fourfold athlete leadership categorization for networks

First, we used the data of Study 2 to test the reliability of the leadership categorization (i.e., task, motivational, social, and external leadership role) with respect to our network approach, because the categorization was originally developed based on perceptions of only the *best* leader in each role (Fransen et al., 2014). We thus examined the overlap between the different networks to establish whether the roles are also distinct if we included the complete leadership structure of the team, instead of only the best leader. To determine this network overlap, QAP-correlations between the different leadership networks were calculated for each team. This social network measure determines the correlation between two networks, thereby examining whether a player, scoring high (or low) on one leadership network (e.g., task leadership), also scores high (or low) on another leadership network (e.g., motivational leadership). In Table 3, the QAP-correlations, averaged over all teams, are indicated.

The results revealed only moderate correlations, suggesting that the four different leadership roles, although correlated, are clearly distinct leadership roles, which confirms H1. Furthermore, the highest correlation was found between the two on-field leadership networks, namely the task and the motivational leadership quality networks. This finding holds for both male and female teams, in all sports, regardless of the competition level. In other words, team members who perceive a player as a good task leader were more likely to perceive this player also as a good motivational leader, regardless of their gender, sport, or competition level. In addition, the second highest correlation was found between the motivational and the social leadership quality network. Also this finding held for both male and female teams, regardless of competition level, in soccer, basketball, and volleyball.

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.

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

Note. For the team captain, the average athlete leadership rank is presented in parentheses.
[a] These analyses are based on Study 1.
[b] These analyses are based on Study 2.
[c] 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.

One-way Anova's revealed no significant differences between the strength of the correlations between all four networks with regard to sport, team gender, and level. The only difference that was (marginally) significant was the correlation between task and external leader as a function of playing level ($F = 4.55$; $p = .046$). More specifically, the task leadership quality network correlated significantly more strongly with the external leadership quality network in high level teams ($r = .51$) than in low level teams ($r = .34$).

These findings verified the reliability of the existing leadership categorization when taking into account the complete leadership structure within the team, thereby confirming H1. As a result, we can proceed to the main purpose of the present study: examining the complete leadership structure within teams, thereby comparing the leadership quality of the coach and the athlete leaders, in general, and with respect to the four different leadership roles.

3.3. Aim 2 – Comparing coach leadership with formal and informal athlete leadership

We calculated the indegree centrality as a measure of the average leadership rating received from all other players in the team (see Table 4). The node size and the position centrality of the players in the networks in Figs. 1–3 are based on the players' indegree centrality. Table 4 presents the indegree centrality scores for the coach and the players, averaged over all teams. Furthermore, we examined the captain, as formal leader of the team, and the actual 'athlete leader' on each role. This athlete leader refers to the player that was perceived as best leader on that specific role. This person can be the team captain, but can also be an informal leader scoring the highest on leadership quality.

To obtain more insight in the leadership status of the team captain, we computed a ranking for all players in the team, based on their indegree centrality scores. This ranking thus ranged from 1 (*player who is perceived as best leader by the other team members*) to *n* (*player who is perceived as worst athlete leader by the other team members*), with *n* being the total number of players in the team. The averaged ranking of the team captain over all teams, as presented in Table 4, reveals whether formal or informal leaders are perceived as providing the highest-quality leadership on a specific role. If the team captain is not the highest ranked, this means that in most teams informal leaders are perceived as better leaders on that role than the captain.

For both Study 1 (general leadership) and Study 2 (role-specific leadership) we will follow the same approach to present the results. First, we investigated athlete leadership within the team by comparing the team captain with the best athlete leader (H2a) and with the average of all players in the team (H2b). Next, we compared the leadership quality of the coach with the leadership quality of the best athlete leader, in general (H3a), and on the different leadership roles (H3b and H3c).

In Study 1, the team captain had an average rank of 2.3 regarding his/her general leadership qualities. The general leadership quality of the team captain (i.e., indegree centrality) was, on average, perceived as significantly lower than the general leadership quality of the best athlete leader ($t = 4.37$; $p < .001$). More specifically, in 14 of the 25 teams, other players than the team captain were perceived as better leaders. The finding that the formal leader is not always the best leader in the team confirms H2a. However, it should be noted that the team captain is still perceived as a relatively important leader. In fact, in 21 of the 25 teams, the captain was placed in the top 3 ranking of general leadership quality. Furthermore, the team captain is perceived as a significantly better leader than the average player in the team ($t = 11.22$; $p < .001$), which is in line with H2b. In contrast with H3a, findings revealed that the best athlete leader was perceived as a significantly better leader than the coach ($t = 2.41$; $p = .02$). More specifically, in only 8 of the 25 teams, the coach was perceived as a better leader in general than the best athlete leader.

One-way Anova's did not reveal any significant differences with respect to the average athlete leadership quality (i.e., indegree centrality at team level) between high and low level teams ($p = .21$), male and female teams ($p = .17$), or between the different sports ($p = .97$). Furthermore, independent-samples Kruskal–Wallis tests revealed no significant differences in the leadership ranking of the team captain between high and low level teams ($p = .86$), male and female teams ($p = .75$), or between the different sports ($p = .54$).

In Study 2, we compared the leadership qualities of the best athlete leader with the leadership quality of the team captain and the coach on each of the four leadership roles. First, looking at the leadership within the team, the results revealed that the best athlete leaders on each role are perceived as significant better leaders than the team captain ($t = 2.90$; $p = .009$ for task leadership; $t = 3.00$; $p = .007$ for motivational leadership; $t = 4.43$; $p < .001$ for social leadership; $t = 2.18$; $p = .04$ for external leadership; $t = 2.52$; $p = .02$ for all-round leadership). More specifically, in respectively 9, 12, 15, and 6 teams of the 21 teams, other leaders than the captain take the lead on the task, motivational, social, and external leadership roles. In addition, the best athlete leader was perceived as a significantly better all-round leader than the captain ($t = 2.52$; $p = .02$), thereby confirming H2a.

However, in line with Study 1, Study 2 corroborated that the team captain is not only a formal leader, but that he/she does indeed occupy an important leadership role. More specifically, in respectively 12, 6, 9, and 15 teams of the 21 teams, the team captain is perceived as best leader on the task, motivational, social, and external leadership roles. Furthermore, in half of the teams (12 teams) the captain was perceived as the best all-round leader, and in five teams the captain was still perceived as second or third best all-round leader. Independent-samples Kruskal–Wallis tests revealed no significant differences for the leadership ranking of the captain with respect to each of the four roles between high and low level teams, between male and female teams, or between the different sports. Only one exception emerged; the captain was ranked significantly higher on social leadership in soccer and basketball teams than in volleyball teams ($p < .05$).

In addition, the perceived athlete leadership quality of the team captain was significantly higher than the team's average on respectively task leadership ($t = 7.33$; $p < .001$), motivational leadership ($t = 5.72$; $p < .001$), social leadership ($t = 3.95$; $p = .001$), external leadership ($t = 5.69$; $p < .001$), and all-round leadership ($t = 6.08$; $p < .001$). It can therefore be concluded that, although the team captain is not always perceived as the most important leader, he/she does occupy an important leadership function, thereby confirming H2b.

Finally, we compared the leadership quality of the coach and the best athlete leader in the team. No significant difference emerged between the all-round leadership quality of the coach and the best athlete leader ($t = 1.24$; $p = .23$), which contradicts H3a. Also with regard to the task and external leadership role, no significant difference was observed between the leadership quality of the coach and the leadership quality of the best athlete leader (respectively $t = .96$; $p = .35$ and $t = .56$; $p = .58$), thereby contradicting H3b. More specifically, the coach was perceived as best task leader in 11 of the 21 teams, and as best external leader in 13 of the 21 teams. For the motivational and social leadership quality, a significant difference emerged in line with H3c: the athlete leader is perceived as a significant better leader than the coach on both motivational ($t = 2.31$; $p = .03$) and social leadership ($t = 5.28$; $p < .001$). More specifically, in only 6 and 2 teams of the 21 teams, the coach was perceived as best motivational and social leader respectively.

4. Discussion

Athletes are imbedded in webs of interpersonal relationships with their teammates and coach. Nevertheless, most sport psychology research has typically relied on individual level measures to assess team level constructs such as leadership. Brass and Krackhardt (1999, p. 181) highlighted this research gap by stating: "Largely ignored in leadership research is an approach that focuses on the structure of interpersonal relationships: a social network theory of leadership." The present study was, to our knowledge, the first to use social network analysis to obtain a greater insight in the leadership structure within sports teams. In contrast to previous studies, we did not restrict the analysis to the best leader or to the formally appointed leaders, but instead, we covered the full range of leadership relations within the team, thereby providing evidence for shared leadership. This network approach allowed us to compare the leadership quality (as perceived by all team members) of the coach, the team captain, and the informal athlete leaders within the team.

4.1. Aim 1 – The reliability of the fourfold athlete leadership categorization for networks

We first verified the reliability of the recently developed athlete leadership categorization, including the roles of task, motivational, social, and external leader, when using leadership networks. Very similar findings emerged as in the original manuscript that developed this classification based on only the best leader in each of the four leadership roles (Fransen et al., 2014). In particular, in line with H1, moderate positive correlations were observed between the different leadership networks. To a certain degree, general leadership capacities are thus transferable between the different roles; a good leader in one leadership role is more likely to be perceived as a good leader in another leadership role. However, the fact that only moderate correlations emerged, corroborates previous research, demonstrating that the four roles are clearly distinct leadership roles, which require specific leadership qualities (Fransen et al., 2014).

Our results revealed the highest correlation between the task and the motivational leadership quality networks, regardless of team gender, sport, and competition level. This finding extends previous research that observed the highest overlap between the *best* task leader and the *best* motivational leader (Fransen et al., 2014). Three possible explanations may explain this relationship. First, playing time was demonstrated to be an attribute of both high-quality task leaders and high-quality motivational leaders (Fransen et al., 2015c). In other words, the field players, rather than the bench players, were perceived as good task and motivational leaders by their teammates, which may have caused the relatively high overlap between these two on-field leadership quality networks. Second, the tactical advice that is provided by the task leader might also serve as a good strategy to cope with competition-specific stressors (Anshel et al., 2000). For example, for a stressed or discouraged player, it may be beneficial to focus on the task at hand, rather than on his/her own negative emotions. Therefore, the tactical advice provided by the task leader might help to steer the emotions in the right direction, thereby motivating the player. Third, tactical communication was demonstrated to be an important indicator of players' confidence in their team (Fransen et al., 2012, 2015d). By giving tactical advice, the task leader is perceived as being confident in his/her team. Because expressing confidence by the leader has a motivational impact on the other players (Fransen et al., 2012, 2015a,b; Moll et al., 2010), it can be inferred that the task leadership quality of a player is positively correlated with his/her motivational leadership quality.

The second highest overlap was found between the motivational and social leadership quality networks, regardless of team gender, sport, and competition level. Because these leadership roles refer to interpersonal relations, respectively on and off the field, it can be assumed that interpersonal leadership qualities are characteristic for both roles. Our data thus demonstrate that previous findings on the correlations between the different leadership roles, which only took the best leader into account (Fransen et al., 2014), can be transferred to complete leadership networks, thereby confirming H1.

4.2. Aim 2 – Comparing coach leadership with formal and informal athlete leadership

After establishing the reliability of our theoretical framework including the four leadership roles, we proceeded to the main aim of our study, namely to provide a deeper understanding of the leadership structure within sports teams, thereby comparing the perceived leadership quality of the coach and both formal and informal athlete leaders. Three major conclusions can be drawn in this regard.

First, with regard to athlete leadership, both Study 1 and Study 2 revealed that in half of the teams an informal leader, rather than the team captain, was perceived as the best all-round leader. Furthermore, Study 2 added that especially on the motivational and social leadership role mainly informal leaders were perceived as best leaders. These findings corroborate earlier research (Loughead and Hardy, 2005; Loughead et al., 2006) that besides the team captain, other players (i.e., informal leaders) take the lead within sports teams, thereby confirming H2a.

Second, it should be noted that, although the team captain is not always perceived as best leader, he/she does fulfill an important leadership function in most teams. More specifically, in 83% of the investigated teams, the captain is seen as one of the top three leaders (i.e., with respect to general or all-round leadership), which confirms H2b. Study 2 provided more insight in the role-specific leadership function of the captain and revealed that captains were often rated higher by their teammates on external leadership quality, followed by task leadership quality. With

respect to the motivational and social role, other players than the captain were generally perceived as best leader. These results align with the findings of Loughead et al. (2006) who observed that the majority of external leaders (79%) occupied a formal leadership position in their team (i.e., captain or assistant-captain), followed by task leaders (65%) and social leaders (57%). These findings temper previous research stating that in 44% of the teams the captain was not perceived as best leader on any of the four leadership roles (Fransen et al., 2014). It should be noted though that the present study included only 575 participants and was administered in the presence of the other teammates, whereas the study of Fransen et al. (2014) included 4451 participants and was administered online.

Third, we compared the leadership quality of the coach with the leadership quality of the best athlete leader in the team. With regard to the general leadership quality (Study 1) and the all-round leadership quality (Study 2), the results revealed that, in contrast to H3a, the coach was perceived as best leader in only 35% of the teams. Although most coaches have followed a coach education program, it is the athlete leader who is perceived as best all-round leader in most teams. Study 2 provided more detail with respect to the different leadership roles. Regarding the task and external leadership roles, no significant differences were observed between the leadership quality of coaches and athlete leaders. In contrast to H3b, coaches were not always perceived as best leaders, but instead, coaches and athlete leaders shared the lead on these roles. This finding contradicts previous research demonstrating that coaches exhibited more task-oriented behavior than athlete leaders (Loughead and Hardy, 2005). However, the results do align with a previous study demonstrating that both coach and athlete leadership were equally important for task cohesion (Price and Weiss, 2013). Finally, in line with H3c, the athlete leaders were perceived as significantly better leaders than their coach on the motivational and social leadership role. This finding corroborates earlier research, demonstrating that athlete leaders exhibit the behaviors of positive feedback and social support (i.e., characteristic behaviors for the motivational and social leader) to a greater extent than their coaches (Loughead and Hardy, 2005). Moreover, Price and Weiss (2013) also found that athlete leadership was more strongly related to social cohesion than coach leadership.

4.3. Strengths, limitations, and further research avenues

A major strength of this study was the large number of participating teams, including male and female athletes across diverse team sports and levels of competition. To date, most social network studies in sports settings have included only a small number of teams. For instance, the sports studies described in the present manuscript examined one to three sports teams (Bourbousson et al., 2010; Cotta et al., 2013; Lusher et al., 2010; Passos et al., 2011; Warner et al., 2012). The present study is, to our knowledge, the first in sports settings that encompasses data of more than 40 teams (including 575 players) in its social network analyses.

Moreover, the stratified sampling technique, used to select the participating teams, allowed for comparison between the different sports, and between male and female teams, playing at high and low level. Leaving a few marginally significant differences aside, we can conclude that the consistency in the relations demonstrated for both male and female teams, for high and low competition level, and for the different sports testifies to the reliability and generalizability of the study's findings.

In addressing the limitations of the present research, several opportunities for future research emerge. First, the majority of the participants in our studies were young adults (i.e., 90% of the participants were between 16 and 31 years old), and hence the obtained results only pertain to this age group. Future research could examine to what extent the present results also apply to athletes of a different age and/or different developmental level (e.g., youth athletes or senior athletes).

Second, in terms of the design, a cross-sectional approach was adopted, limiting our ability to examine the stability of the different leadership structures within the team over time. Hoppe and Reinelt (2010, p. 600) stated that "Understanding the nature of networks and changes in them is an increasingly important aspect of leadership development evaluation." Related to this point, Emery et al. (2013) assessed emerging leadership perceptions at three time points in a newly formed student group. Given the observed variations in leadership perceptions, future research should adopt a longitudinal design that allows for the examination of the evolution and the stability of the different leadership networks over the course of a season.

Warner et al. (2012) adopted such a longitudinal approach in a sports setting and assessed an efficacy network of two basketball teams at four time points during the season. The results revealed that the head coach moved from a central network position during the off-season to a more decentralized location at the end of the season. A longitudinal design would enable researchers to verify whether this in-season shift of the coach (and team captain) from a central position to a more decentralized position can also be observed in the different leadership networks.

Third, the present manuscript proposes a radical shift from the traditional vertical view on leadership (in which the coach is viewed as the primary leader in the team) to the idea of shared leadership (in which the coach, together with the team captain and the informal leaders take the lead). Although the present manuscript provides convincing evidence for the existence of shared leadership in sports teams, future research should provide more insight in the antecedents and outcomes of sharing the lead.

With regard to the antecedents of shared leadership, it would be interesting to examine the impact of the coaching style of the coach on the emergence of high-quality athlete leaders within the team. Two major coaching approaches can be distinguished: an autocratic, controlling style and an autonomy-supportive style. Mageau and Vallerand (2003) proposed seven autonomy-supportive coaching behaviors, among which allowing athletes to work independently and to have input into solutions for solving problems. It can be assumed that such a coaching style, in which athletes are given autonomy, rather than being controlled, nurtures the development of athletes' leadership abilities.

With regard to the outcomes of shared leadership, previous research has provided preliminary evidence that shared leadership is associated with higher levels of team confidence, team identification, and performance (Fransen et al., 2014). Furthermore, Fransen et al. (2015c) demonstrated that teams with higher levels of athlete leadership quality were characterized by a stronger social connectedness. However, neither of these studies examined which types of shared leadership lead to the most optimal team functioning. For example, is the quality of the coach or the quality of the athlete leaders essential? Or is high-quality of both coach and athlete leadership a prerequisite for successful shared leadership? The answer to these questions might even differ as a function of the developmental stages of the athletes and the team: for teams with young athletes or for newly formed teams, leadership of the coach might be the most essential, whereas in teams with adults or in more mature teams, athlete leadership might gain greater importance.

Furthermore, future research could investigate the moderating mechanisms underlying the effectiveness of shared leadership. Previous research already indicated that role differentiation (i.e., different leaders fulfilling different leadership roles) is positively linked with team confidence, team identification, and performance (Fransen et al., 2014). However, other boundary conditions, such

as a shared vision or having adequate task competence, might have to be fulfilled for shared leadership to be effective. More insight into these moderating mechanisms would help coaches to set up a structure of effective shared leadership.

Finally, a fruitful line for further inquiry is to replicate the current study in other cultures. It is indeed possible that the leader status of the formal leader, and the attached emotional significance, is culture-specific. For example, in Flanders, where the current study was conducted, the team captain wears a specific armband or the captain's shirt number is underlined. These observable signs increase the public visibility, thereby often increasing the emotional value for the player and/or the importance attached to this function by the fans. Future research should verify whether the same findings are also found in different cultures, in which visible signs of formal leadership are absent.

4.4. Implications for theoretical knowledge

The present study extends current literature on athlete leadership by providing a deeper insight in the complete leadership structure of sports teams. First, the reliability of the athlete leadership categorization, developed by Fransen et al. (2014), was established for the analysis of leadership networks. As such, not only with respect to the best leader in the team, but also when taking into account the complete leadership structure within the team, the four leadership roles emerged as clearly distinct roles. This categorization thus forms a reliable theoretical framework for further athlete leadership research.

Second, the network approach made it possible to compare coach and athlete leadership, thereby including both formal and informal leadership. The present manuscript demonstrated that coach, captain, and informal leaders shared the lead on the different leadership roles. The study findings are thus in line with recent theorizing in the organizational leadership literature on shared leadership. The integrative model of Locke (2003) constitutes a good theoretical framework to underpin our findings. This integrative model combines three different leadership approaches: (1) the top-down model, (2) the bottom-up model, and (3) the model of shared leadership.

Our findings provide support for each of the three models. More specifically, in more than half of the teams, the coach took the lead on the task and external leadership role, which supports the top-down influence of the coach. Second, on the motivational and social leadership role, the athletes within the team were clearly perceived as being better leaders than their coach, thereby supporting the bottom-up model. Finally, the results provided evidence that the captain together with the informal athlete leaders shared the lead on the different leadership roles, providing support for the model of shared leadership.

4.5. Implications for coaching practice

High school sports coaches have listed a lack of leadership skills as the sixth most frequently cited problem among adolescent athletes today (Gould et al., 2006). Furthermore, semi-structured interviews with 13 former high school captains reported that not one of these captains was trained or prepared by their coaches for their leadership role (Voelker et al., 2011). These are only a few examples of research studies emphasizing a clear need for leadership development in young people (Gould and Voelker, 2010). The findings from the present study demonstrated that social network analysis is a viable diagnostic tool to identify leadership abilities of all players within a team, which constitutes the first step in a leadership development program. We thereby distinguish between the contribution to coaching practice of (1) a team-specific leadership network analysis and of (2) the general results as presented in the current manuscript, including the 46 tested teams.

First, network analysis of the different leadership networks for a specific team (such as presented in Figs. 1–3) provides a viable diagnostic tool to identify the key leaders on the different leadership roles within the team. Such a network approach does not only reveal the athletes who are perceived as best leader by their teammates, but also provides insight in the remaining leadership structure of the team (e.g., the presence of cliques). For example, this approach distinguishes between the situation in which two players are perceived as best task leaders by all of their teammates and the situation in which half of the team nominated one task leader and the other half of the team assigned another task leader. Especially in the latter situation, it might be beneficial for the team to formally appoint both leaders as task leader to impact the whole team. This network approach provides leadership information that is very specific to the team, thereby allowing us to map the evolution of these leadership structures over time.

As Bailey (2001, p. 187) stated: "the man who correctly understands how a particular structure works, can make it work differently with much less effort than a man who does not know these things". With regard to sports teams, equipping a coach with knowledge of the leadership structure within the team, should yield similar benefits (Warner et al., 2012). That is, a coach with knowledge of the key relational structures within the team can more effectively lead the team to success, and using social network analysis might be an important tool to reach this aim.

Second, the results of the present manuscript lead to several general practical implications that should be considered by coaches, sport psychology consultants, and sports teams. More specifically, our findings support previous research that not only formal leaders, but also informal leaders take the lead on the different leadership roles (Fransen et al., 2014; Loughead et al., 2006). Therefore, coaches should not solely focus on the team captain, but spend time and effort to identify the other athlete leaders on the different leadership roles within their team. It is conceivable that identifying the athlete leaders within the team will enhance players' role clarity and, as such, also the effectiveness of their role fulfillment (Crozier et al., 2013; Martens, 1987). In other words, if players realize that teammates perceive them as a leader, this recognition will strengthen their sense of responsibility, thereby motivating them to fulfill their leadership role even better.

However, coaches and sport psychology consultants should not only *identify* the key leaders, but also invest time and energy to *improve* the leadership qualities of these athlete leaders with respect to the different leadership roles. In this regard, leadership development programs that focus on how athlete leaders can optimally fulfill the different roles would support coaches and sport psychology consultants to strengthen the athlete leadership quality within their team.

To conclude, the study findings demonstrated 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. Leadership is spread throughout the team: the coach, the team captain, and the informal athlete leaders lead their team together.

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