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The Art of Athlete Leadership: Identifying High-Quality Athlete Leadership at the Individual and Team Level Through Social Network Analysis

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This research aimed to introduce *social network analysis* as a novel technique in sports teams to identify the attributes of high-quality athlete leadership, both at the individual and at the team level. Study 1 included 25 sports teams (N = 308 athletes) and focused on athletes' general leadership quality. Study 2 comprised 21 sports teams (N = 267 athletes) and focused on athletes' specific leadership quality as a task, motivational, social, and external leader. The extent to which athletes felt connected with their leader proved to be most predictive for athletes' perceptions of that leader's quality on each leadership role. Also at the team level, teams with higher athlete leadership quality were more strongly connected. We conclude that social network analysis constitutes a valuable tool to provide more insight in the attributes of high-quality leadership both at the individual and at the team level.

Keywords: athlete leaders, leader characteristics, leader attributes, shared leadership, leadership roles, sport psychology

The quest for the perfect leader resembles the quest for the Holy Grail. If it could be captured, distilled, and replicated, it would lead to guaranteed success for any government, military organization, academic institution, and business organization that possessed it (Medina, 2011). The same could be said for sports teams, where leadership is seen as a key factor for an optimal team functioning (Cotterill, 2013). Therefore, the question "What is effective leadership?" has intrigued researchers for ages. The first leadership studies (around 1930–1950) were characterized by the *great man* theory of leadership. This theory adopted a trait approach, thereby embracing the idea that effective leadership is rooted in the personality of a person. That is, certain individuals have special innate or inborn characteristics that make them effective leaders, and it is exactly these characteristics that differentiate them from nonleaders (Northouse, 2010).

However, the fact that a common set of leadership characteristics was never found has forced researchers to adopt a drastically different view on leadership: the behavioral approach to leadership. This behavioral approach emerged from the idea that effective leaders demonstrated similar leadership behaviors, regardless of the situation (e.g., Tharp & Gallimore, 1976). From this viewpoint, leadership could be learned and developed by teaching the most effective behaviors to the leaders. Chelladurai's (1990) multidimensional model of sport leadership went one step further by not only highlighting the importance of leader and team member characteristics, but also the importance of situational factors. For a detailed review on the various approaches that have been used to study leadership, we refer to the work of Chase (2010).

It should further be noted that leadership research in sport has mainly focused on the influence of the coach (see Chelladurai, 1994, and Chelladurai & Riemer, 1998, for reviews). In this respect, coaches have been shown to influence athletes' identification with their team, their team confidence, the team's cohesion, and the team's functioning (De Backer et al., 2011; Felton & Jowett, 2013; Hampson & Jowett, 2014; Price & Weiss, 2013). While effective leadership of the coach is vital to the team's functioning, more recent studies demonstrate that also athletes can fulfill important leadership roles (Fransen, Vanbeselaere, De Cuyper, Vande Broek, & Boen, 2014). In this regard, athlete leaders have been shown to positively impact their teammates' satisfaction, their team confidence, the role clarity within the team, the team

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communication, the team's task and social cohesion, and ultimately the team performance (Crozier, Loughead, & Munroe-Chandler, 2013; Fransen, Haslam, et al., 2015; Fransen et al., 2012; Price & Weiss, 2011; Vincer & Loughead, 2010). Given all these positive outcomes, the quest for high-quality athlete leadership has made its entry into sport research. The present study attempts to move athlete leadership research forward by using social network analysis (SNA) as a novel tool in sports contexts to provide a deeper insight in high-quality athlete leadership, both at the individual and at the team level.

Aim 1: The Quest for Effective Athlete Leaders

The majority of previous studies focused on traits that differentiate the athlete leaders from the other players. In this regard, athlete leaders have been shown to demonstrate higher levels of competitiveness, responsibility, dominance, and ambition (Klonsky, 1991). Moreover, Glenn and Horn (1993) validated a shortened version of the Sport Leadership Behavior Inventory, which included the following athlete leaders' characteristics: determined, positive, motivated, consistent, organized, responsible, skilled, confident, honest, and respected. In addition, an often-studied attribute of athlete leaders has been sport competence, also operationalized as athletes' playing time or their starting status (Loughead, Hardy, & Eys, 2006; Moran & Weiss, 2006; Price & Weiss, 2011; Rees & Segal, 1984). Team tenure also emerged as an essential characteristic with athlete leaders being typically the more senior members of the team (Rees & Segal, 1984; Tropp & Landers, 1979; Yukelson, Weinberg, Richardson, & Jackson, 1983). For instance, Loughead et al. (2006) provided support for these findings among varsity student-athletes with four or five years of playing eligibility by demonstrating that the majority of the athlete leaders were third- or fourth-year players.

More recently, attributes associated with the relation between leader and followers have become more prominent. For example, friendship quality, which has also been termed *peer acceptance* or *social connectedness*, was demonstrated to be an important attribute of good athlete leaders (Moran & Weiss, 2006; Price & Weiss, 2011). Similarly, Yukelson et al. (1983) found that strong off-field friendship was associated with higher leadership ratings among college baseball and soccer players. However, when examining student-athletes' perceptions of formal and informal team leaders, likeability was not seen as a necessary attribute for good leadership (Holmes, McNeil, & Adorna, 2010). In this study, both men and women reported that they could play for and respect a leader, even when the leader was not popular or liked by other teammates.

Two main limitations that characterize previous research on the attributes of athlete leaders will be addressed in the present article. First, previous research examined athlete leadership by differentiating between "no leader" and "a leader." However, it is conceivable that, to optimize leadership within teams, it is not the presence or absence of leadership that is the most important, but instead the *quality* of the leadership provided by team members. Therefore, the current study investigated which leadership attributes are most decisive for athletes' leadership *quality*. In other words, we did not assess what is required for a player to be a leader, but more importantly, what is required for players to be perceived as a *good* leader by their teammates.

Second, previous research has mostly focused on *the* leader of a sports team. Recently however, it was established that athlete leaders could occupy different leadership functions. Building upon the previous leadership categorization of Loughead et al. (2006), Fransen et al. (2014) distinguished between four different leadership roles that athletes can occupy (1) the *task leader*, who gives his or her teammates tactical advice and adjusts them when necessary; (2) the *motivational leader*, who encourages his or her teammates on the field to perform at their best; (3) the *social leader*, who develops a good team atmosphere outside of the playing field; and (4) the *external leader*, who handles the communication with club management, media, and sponsors. A better leadership quality on each of these roles was demonstrated to be positively associated with teammates' identification with their team and their confidence in the team's abilities (Fransen, Coffee, et al., 2014). Therefore, the present article includes two studies. Whereas Study 1 focuses on the attributes of athlete leaders' general leadership quality, Study 2 goes more in depth and investigates the attributes of athlete leadership quality within the four different leadership roles (i.e., task, motivational, social, and external leadership role). As such, the present article will inform us not only on the attributes that are characteristic for leadership quality in general, but also on the attributes that are characteristic for high-quality athlete leadership on each of the four specific leadership roles (i.e., task, motivational, social, and external leader).

Team-Level Attributes of Teams With High Athlete Leadership Quality

Having discussed the individual level (i.e., which attributes are characteristic of a high-quality athlete leader), another question emerges: what are the attributes of teams with high-quality leadership? In organizational settings, a number of studies have linked leadership perceptions to individual-level outcomes, such as pay raises and job promotions (Hoppe & Reinelt, 2010). However, the relationship between leadership perceptions and organization-level outcomes remains unclear. Also in a sport setting, research on the attributes of an individual leader is much more prominent than research linking the average leadership qualities in the whole team to team-level characteristics. However, recent qualitative studies demonstrated that the presence of athlete leaders in the team positively impacted a variety of group dynamic constructs at the team level, such as role clarity within the team, team cohesion, team communication, team

resilience, and team performance (Crozier et al., 2013; Morgan, Fletcher, & Sarkar, 2013, 2015).

To our knowledge, only one study to date has investigated the attributes of sports teams with effective athlete leadership in a quantitative way. More specifically, Price and Weiss (2011) found that effective athlete leadership was associated with higher levels of collective efficacy and a stronger task and social cohesion. However, when looking more closely at their methodology, the authors actually examined the correlations at an individual level, namely the correlations between a player's leadership skills and the player's perceptions of collective efficacy and team cohesion. To study team-level attributes, it is necessary to gain insight in all leadership perceptions within the team.

Social Network Analysis

Social network analysis (SNA) is a novel but promising tool to obtain a full insight in all leadership relations *within* a team and to identify differences in the leadership structure *between* different teams. A social network approach views groups in terms of networks, consisting of nodes (representing the individual actors) and ties (representing the relations between the actors) (Wasserman & Faust, 1994). Over the past decade, the use of this network approach has grown exponentially in a wide variety of areas, including sociology, politics, terrorism networks, and organizational research (Borgatti, Mehra, Brass, & Labianca, 2009). Organizational research has only recently included this network approach to the examination of leadership. For example, Emery et al. (2013) demonstrated that group members' personality traits (e.g., extraversion, openness to experience, and conscientiousness) predicted the emergence of leaders in newly formed groups. Hoppe and Reinelt (2010), on the other hand, revealed that leadership networks were characterized by attributes such as collaboration and information sharing.

Although Nixon (1993) stated that SNA could be a valuable tool to analyze leadership structures in sports teams, to our knowledge, no study has heeded Nixon's suggestion. In addition, Lusher, Robins, and Kremer (2010) noted that sports teams are the ideal object of investigation for SNA because they are a well-defined group of interdependent individuals, or in social network terms, a full network. Moreover, the relations between the different athletes might have a direct impact on measurable performance outcomes.

The few studies that have used social network measures in sports teams focused on the relations between the players with regard to their interactive play (Cotta, Mora, Merelo, & Merelo-Molina, 2013; Kyoung-Jin & Yilmaz, 2010; Passos et al., 2011). In these networks, the players were considered as the nodes and the passes between teammates were viewed as the relations. Three case studies did use SNA to examine the psychological interrelations between the members of a sports team. Lusher et al. (2010) examined a football team, thereby constructing a friendship network (based on the question "Who do you consider as a friend?") and an influence network (based on the question "Who do you consider as influential?"). The relationships with players' ability revealed that ability was not related with being nominated as a friend but did positively correlate with being seen as influential by the teammates. The second study (Lusher, Kremer, & Robins, 2013) constructed trust networks for three sports teams, thereby mapping the extent to which team members trusted each other. Their findings demonstrated that the trust-generating structures were found in the team with the highest overall team performance. The third study (Bourbousson, R'Kiouak, & Eccles, 2015) used social network analysis to identify patterns of awareness within basketball teams. More specifically, in the constructed networks, the nodes represented the team members and the ties pictured members' awareness of other members during ongoing performance. A considerable limitation of each of these case studies is that both used binary networks (i.e., relying on the only possible answers being yes or no), which did not provide any information on the strength of these relations.

The Present Study

To our knowledge, the current study is the first in a sport setting that uses SNA to obtain more insight in the attributes of high-quality athlete leadership on four different leadership roles, both at the individual and at the team level. Moreover, the current study does not rely on binary networks (ties represented by 0 = *no leader* or 1 = *a leader*), but instead on valued networks, in which the strength of the ties represents the athlete leadership quality, ranging from 0 (*very weak leader*) to 4 (*very good leader*). The added value of this network approach resided in the inclusion of the perceptions of all the players in the team. The current research has three major aims.

Aim 1

To link an individual's leadership quality, based upon the perceptions of all other teammates, with his or her personal characteristics. The investigated attributes included both self-reported attributes (e.g., age, years of experience) as well as attributes rooted in the perceptions of others (e.g., the extent to which each of the teammates feels connected to the leader). Given the clearly distinct role content of the four leadership roles that are investigated in the current study, we assume that different leader attributes will be predictive in determining the leadership quality in a given role (H1). Three specific hypotheses are formulated. First, the definition of social leader portrays this leader as the confidant of the team who deals with interpersonal team conflicts. In this regard, it seems essential that team members feel connected to the social leader, to call on this leader when needed. Therefore, we expect that the perceived quality of social leaders is characterized by the extent to which team members feel

connected to their social leader (H1a). Second, because Mosher (1979) noted that one of the key tasks of a captain is to represent the team at receptions, meetings, and press conferences, we expect that captaincy is the most characteristic attribute for external leadership quality (H1b). Third, previous research demonstrated that all of the task leaders were starters, while the social leaders were divided between starters and nonstarters (Rees & Segal, 1984). Because the specific role of the task and motivational leader is situated *on* the field, it is conceivable that playing time is a prerequisite for these leaders to optimally fulfill their role. Therefore, we hypothesize that playing time will be the most characteristic attribute for the perceived quality of the on-field leaders (i.e., task and motivational leader) (H1c).

Social Connectedness. It has been suggested that SNA is also a useful methodology to explore the social relations among team members (Lusher et al., 2010; Warner, Bowers, & Dixon, 2012). Therefore, we will use SNA not only to construct the leadership networks, but also to construct a social connectedness network in which each player indicates how strongly connected he/she feels with the other team members. Specific SNA analyses will provide more insight in the relationship between the different leadership networks and this social connectedness network, both at the individual level (Aim 2) and at the team level (Aim 3).

Aim 2

With regard to the individual level, we will first explore which type of athlete leader (i.e., task, motivational, social, or external) relies most on the quality of his or her social relations to be perceived as a good leader. Because the social leader is the team's confidant and cares for a good atmosphere in the team, we believe that it is crucial for his or her perceived leadership quality that teammates feel strongly connected to this leader, more than it is for task, motivational, or external leaders (H2a).

Second, we will use specific SNA measures to provide more insight in what it means—in social network terms—to be a high-quality athlete leader. In this regard, we hypothesize that it is important not only that other team members feel strongly connected to the leader, but also that a leader is able to bridge the gap between other teammates (H2b).

Aim 3

To examine this purpose, we will move beyond the individual level and examine the extent to which high average leadership quality within the team is connected with the team's social connectedness (i.e., the extent to which all players feel connected with each other). A study from organizational psychology with sales teams already demonstrated that the position of the leader in a social connectedness network (i.e., the friendship ties with the others) was related to more favorable leadership ratings by subordinates, peers, and supervisors (Mehra, Dixon, Brass, & Robertson, 2006). In line with previous findings (Mehra et al., 2006), we expect that at the team level, higher athlete leadership quality will be related to higher social connectedness within the team. Because the specific role description of the social leader focuses on the social relations with the other team members, we expect that also at the team level the social leadership quality network will be most strongly related with the social connectedness network (H3a).

Finally, we did not only investigate the average quality of leadership in a team, but also the degree to which leadership is shared among team members. Previous organizational research concluded that shared leadership is a better predictor of social integration between the members of a team than vertical leadership, in which only one individual takes the lead (Pearce, Yoo, & Alavi, 2004). In line with these findings, we propose that teams with higher degrees of shared leadership are characterized by stronger social connectedness (H3b).

Method

Procedure

We adopted a stratified sampling technique by selecting an equal number of teams with respect to sport, gender, and playing level. With regard to the playing level, we differentiated between high-level teams (i.e., national competition level) and low-level teams (i.e., provincial or regional competition level). In total, 71 coaches were invited via e-mail to have their team to participate in the study, resulting in 59 coaches agreeing to participate (i.e., a response rate of 83%). If coaches agreed to participate, we asked for a complete player list of the current season.

Data collection took place after a training session in the period between January and March 2013 under the guidance of a research assistant. Informed consent was obtained from all participants and anonymity was guaranteed. Furthermore, we stated that the players could withhold their participation at any time. Subsequently, all players completed the questionnaire individually, which lasted about 20 min. The research assistant was present to answer possible questions. Ethical clearance for this research project was obtained from the lead author's institution, the APA ethical standards were followed in the conduct of the study, and no rewards were given for participation in the study. Data from this sample have been used in two other articles (Fransen, Van Puyenbroeck, et al., 2015; Loughead, Fransen, Van Puyenbroeck, Hoffmann, & Boen, 2015), but these articles examine different research questions and used different variables of interest.

Participants

Study 1. In total, 35 sports teams participated in Study 1. Given that missing data in social networks can lead to biased results, we used a minimum response rate of 75% of the players as inclusion criterion for each team (Smith

& Moody, 2013; Sparrowe, Liden, Wayne, & Kraimer, 2001; Zohar & Tenne-Gazit, 2008). As a consequence, 10 teams ($N = 100$ athletes) were removed from our dataset. The average response rate of these 10 deleted teams was 64%. The 25 remaining teams included 308 athletes, playing in six soccer teams, seven volleyball teams, six basketball teams, and six handball teams. Fifteen male teams and 10 female teams participated, with 13 teams playing at high level (i.e., national level) and 12 teams playing at low level (i.e., provincial or regional level). The players were on average 24.9 years old ($SD = 7.5$), had 15.7 years of experience in their sport ($SD = 7.0$), and played for 6.5 years in their current team ($SD = 7.2$).

Study 2. In total, 24 sports teams participated with no overlap in the samples of Study 1 and Study 2. Based on the cutoff of 75% for the response rate per team, three teams ($N = 20$ athletes) were removed from our dataset. The average response rate of these three deleted teams was 58%. The 21 remaining teams (267 athletes) included seven soccer teams, eight volleyball teams, and six basketball teams. Furthermore, the sample included 11 male teams and 10 female teams, with 12 teams playing at high level and 9 teams playing at low level. The players were on average 24.3 years old ($SD = 4.9$), had 14.9 years of experience ($SD = 5.8$), and played for 3.7 years in their current team ($SD = 3.4$).

Measurements

Descriptive Information. In addition to several demographic characteristics (e.g., age, years of experience, team tenure), we also assessed other characteristics that might be related to a player's leadership quality. In this regard, players indicated their average playing time on a 5-point Likert scale, ranging from 1 (*almost nothing; 0–25%*), over 3 (*50%*), to 5 (*almost the whole game; 76–100%*). Furthermore, participants indicated to what extent leadership qualities were important in their job or in their free time (e.g., as a leader in youth movement) on a 7-point Likert scale, ranging from 1 (*not at all important*) to 7 (*very important*). Finally, players had to indicate whether they occupied the function of team captain.

Leadership Quality Networks. To create a leadership network, each player on the team rated each teammate with respect to their leadership quality on a 5-point Likert scale, ranging from 0 (*very poor leader*) to 4 (*very good leader*). Based on the roster list, all the names of the players in the team were listed in advance on the questionnaire. For each team, this procedure resulted in a nonsymmetric, directed $N \times N$ leadership quality network (with N being the number of team members). The rows referred to the outgoing ties of the team members (i.e., how players perceived other players' leadership quality), whereas the columns referred to the incoming ties of team members (i.e., how players are perceived by other players with regard to their leadership quality). By convention, the diagonal entries were forced to be missing values, meaning that players do not rate their own leadership quality. This approach resulted in a directed, valued network, meaning that (1) how player A perceives player B's leadership qualities does not necessarily equal how player B perceives player A's leadership qualities, and (2) players rated their teammates' leadership on 5-point Likert scales in contrast with the binary approach (i.e., *leader* or *no leader*) used in previous studies (e.g., Lusher et al., 2010).

Study 1 included leadership networks with respect to the perceived quality of leadership *in general*, based on the question "To what extent do you consider each teammate as having good leadership qualities in general?" Study 2 constructed a specific leadership quality network *for each of the four leadership roles*. As an example of these role-specific leadership quality networks, we will outline the procedure for the task leadership quality network. First, the definition of a task leader, as postulated in previous research (Fransen, Vanbeselaere, et al., 2014), was presented to the participants. Subsequently, each participant had to rate the quality of the task leadership of each of his or her teammates, whose names were listed in advance. Players had to indicate for each of their teammates "how well they perceived their teammate's task leadership qualities" on a 5-point Likert scale, ranging from 0 (*very poor task leader*) to 4 (*very good task leader*). Afterward, the same procedure was followed, which resulted in a nonsymmetric $N \times N$ task leadership quality network for each team with directed, valued relations. The same procedure was adopted to create a motivational, social, and external leadership quality network, thereby relying on the leadership definitions postulated by Fransen et al. (2014). The data of Study 2 thus resulted in four role-specific leadership quality networks for each team.

All constructed leadership quality networks are thus bounded networks because all the nodes (i.e., the different players of one sports team) are known. The ties between two nodes (e.g., tie from player A to player B) characterize the extent to which player A perceived player B as a good leader. As an example, Figure 1 presents the task leadership quality network for one of the participating teams, namely a male basketball team. To maintain the clarity of this figure, we visualized only the strongest leadership perceptions, in other words the perceptions of very good task leadership (i.e., score of 4). The size of each node in the network corresponds to the player's task leadership quality, as perceived by all other players in the team (i.e., the player's indegree centrality). The node size thus does take into account all the arrows, also the ones with scores lower than 4, which are not visualized in the figure. The higher a player's task leadership quality as perceived by all teammates, the larger the node, and the more central we positioned the player in the figure. The best task leader, whose node is filled in Figure 1, thus has the largest node size and is positioned most central in the figure.

Social Connectedness Network. To construct a social connectedness network, participants indicated for each

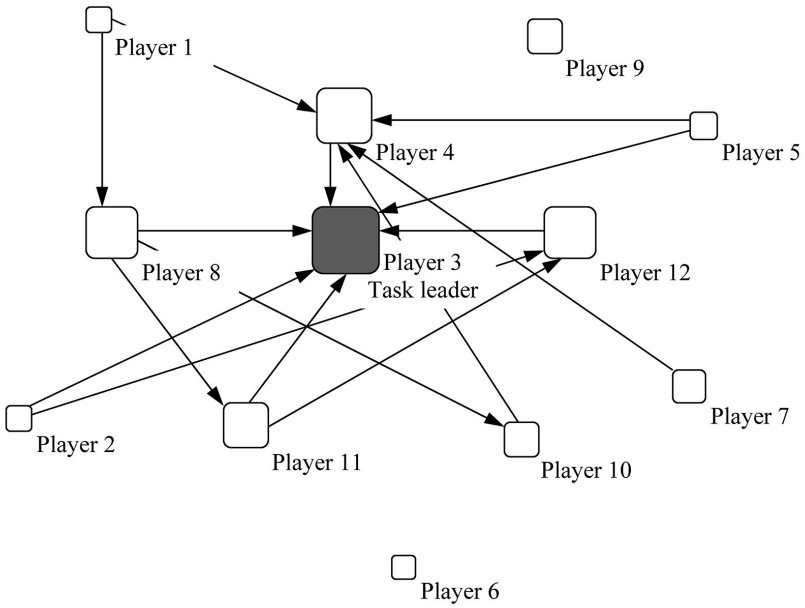


Figure 1 — Task leadership quality network of one specific participating basketball team. A directed line from Player A to Player B means that Player A perceives Player B as a very good task leader (i.e., score of 4). The other scores are not visualized. The node size corresponds to the indegree centrality: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

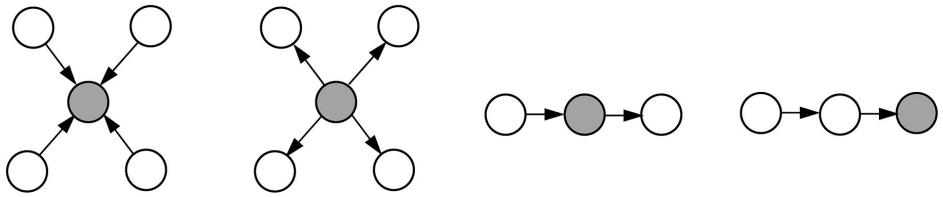
teammate, whose names were listed, "to what extent they felt connected to this person." Players rated their feeling of social connectedness on a 5-point Likert scale, ranging from 0 (*not connected*) to 4 (*very connected*). This procedure resulted in a nonsymmetric, directed $N \times N$ connectedness network for each team, in which the AB entry referred to the extent player A felt connected with player B. Also in this network, the diagonal entries are forced to be missing values, representing that players do not rate the connectedness with themselves. Also the social connectedness networks constitute bounded networks, in which the nodes represent the different players of a sports team. The ties between the nodes (e.g., tie from player A to player B) characterize the extent to which player A feels connected to player B.

Data Analysis

UCINET 6 (Borgatti, Everett, & Freeman, 2002) was used to calculate the social network measures and to perform the social network analyses, presented below.

Social Network Measures at the Individual Level. Three node-specific SNA measures were used in the current study: degree centrality, closeness centrality, and betweenness centrality, which are graphically illustrated in Figure 2. We will explain how each of these measures can deepen our insight in the attributes of athlete leaders and in the leadership structure of sports teams. First, *degree centrality* is a node-specific measure that refers to the average strength of a node's ties. In directed networks, centrality can be further differentiated into *indegree* centrality (i.e., the average strength of the incoming ties) and *outdegree* centrality (i.e., the average strength of the outgoing ties). For the leadership networks, we will only use the indegree centrality of a player, which is operationalized as a measure of the leader's importance in the team and the extent in which the leader can influence other team members (e.g., Hoppe & Reinelt, 2010). With regard to the social connectedness network, both indegree and outdegree centrality will be used. A high indegree centrality in the social connectedness network characterizes the players to which other team members feel strongly connected. A high outdegree centrality in this network on the other hand characterizes the players who feel strongly connected to their teammates.

Second, the *betweenness* centrality of a node refers to the number of times this node falls along the geodesic path (i.e., shortest path) between two other nodes (Freeman, 1979). This measure is often considered as the potential for controlling flows or being a "gate" in a network (e.g., Balkundi & Kilduff, 2006; Freeman, 1979). The higher the betweenness centrality of a node, the more frequently this node is located between other nodes on the shortest path that connects them. In the current study, the betweenness centrality of all players was calculated for the connectedness network. It should be noted that betweenness centrality depends on network size. That is, the larger the network, the more opportunities for a node to be positioned between two other nodes. This makes it difficult to compare centralities from athletes from



A. Indegree centrality B. Outdegree centrality C. Betweenness centrality D. Closeness centrality

Figure 2 — Illustration of the different centrality measures. The marked node has the largest (A) indegree, (B) outdegree, (C) betweenness, and (D) incloseness centrality.

different teams. Therefore, the normalized betweenness was calculated as the percentage of the maximum possible betweenness centrality of each actor (Everett & Borgatti, 1999).

Second, for undirected networks, which are solely constituted of symmetric relations, *closeness* centrality is defined as the inverse of the number of steps it takes for a node to reach all other nodes. In other words, this centrality measure is equal to one divided by the path length of a node to reach all other nodes (Freeman, 1979). Because this study comprises directed networks, we will use the *in-closeness measure*, which refers to the inverse number of steps from all other nodes to a given node. This is an indication of how 'close' all team members are to a given player. Again, this measure was normalized to increase its comparability between teams, following the procedure as proposed by Freeman (1979).

For the two latter SNA measures (i.e., betweenness and closeness centrality), it is crucial to identify the optimal paths between nodes. In contrast to binary networks (in which the optimal path is the shortest path between two nodes), the interpretation is not that straightforward in valued networks (Borgatti, Everett, & Johnson, 2013). For example, it is not clear whether a long path that is composed of strong ties is less or more optimal than a short path that is composed of weak ties. Therefore, we followed previous guidelines (Borgatti et al., 2013) and dichotomized the connectedness network to calculate both measures, so that tie strengths 3 (strong) and 4 (very strong) received value 1 (visualized by a tie), while tie strengths between 0 and 2 received value 0 (no tie). That is, a tie from player A to B in the dichotomized connectedness network exists when player A feels strongly or very strongly connected with player B.

Furthermore, individual-level indicators such as betweenness and closeness centrality require outgoing ties (i.e., perceptions of the other players). Therefore, we were unable to calculate these indicators for players who did not attend the training session and consequently did not complete the questionnaire. For this reason, these players were excluded from the analyses that linked these individual-level SNA measures of the connectedness network with leadership quality perceptions.

Social Network Measures at the Team Level. Two team-level SNA measures can be distinguished. First, network *density* is a team-level measure that was computed for each team with regard to the general leadership quality network (Study 1) and the four specific leadership quality networks (Study 2), using the same procedure for valued networks as described by Sparrowe, Liden, Wayne, and Kraimer (2001). More specifically, the density for each network was computed by summing the values of all relations and dividing this result by the number of all possible relations. As a result, high density scores refer to teams with on average high-quality athlete leadership, whereas low density scores characterize teams with on average low-quality athlete leaders.

Second, the use of network *centralization* has been recommended to assess the extent of shared leadership (Mayo, Meindl, & Pastor, 2003; Small & Rentsch, 2010). In essence, centralization can be considered as a measure of variance in the degree centrality measures of a network and represents a measure of compactness (for the formula see Mayo et al., 2003, p. 204). Because this study focused on players' indegree centrality in the leadership quality networks, only indegree centralization is a matter of interest in the current study. The term *centralization* in the current study thus refers to indegree centralization. When leadership behaviors revolve around a single individual (i.e., high centralization), the leadership network is highly centralized and thus characterized by a low degree of shared leadership. In contrast, a network in which all members are perceived to participate equally in displaying leadership behaviors (i.e., low centralization) will be characterized by a high degree of shared leadership. However, a team in which all players are perceived as poor leaders will also be characterized by a low centralization score. Therefore, it can be concluded that teams with high-quality shared leadership are characterized by the combination of a high network density (high overall leadership quality) and a low network centralization (i.e., leadership is spread throughout the team) (D'Innocenzo, Mathieu, & Kukenberger, 2014; Mayo et al., 2003).

Social Network Analyses. When correlating or regressing different networks, the autocorrelated and

interdependent structure of network data (Wasserman & Faust, 1994) would lead to severe biases when using ordinary least squares regression techniques (Krackhardt, 1987). In the current study, we therefore used quadratic assignment procedure (QAP) hypothesis tests for each team separately to examine the relationships between the different leadership networks and the connectedness network. Because QAP-tests are nonparametric and use restricted permutation tests, these tests are robust against the problem of autocorrelation (Dekker, Krackhardt, & Snijders, 2007; Krackhardt, 1988). More specifically, we performed multiple regression quadratic assignment procedures (MR-QAP). For more details on the QAP and MR-QAP regressions, we refer to Krackhardt (1987, 1988). In Study 2, MR-QAP was used to model the ties in the social connectedness network (i.e., the dependent variable), using multiple independent variables (i.e., the ties in the different leadership quality networks) (Krackhardt, 1988). This analysis was performed for each team separately to determine which leadership quality ties (task, motivational, social, or external) are most predictive for social connectedness ties.

Results

Because Study 1 and Study 2 investigated the same hypotheses (i.e., Study 1 with respect to leadership quality *in general* and Study 2 with respect to leadership quality *on the four leadership roles*), we will present the results according to the sequence of our hypotheses.

Aim 1: Attributes of High-Quality Athlete Leaders

First, we identified the attributes that determined athletes' leadership quality. Table 1 presents the linear regression analyses with the indegree centrality of the different leadership networks as the criterion variable. This leadership quality measure refers to the degree to which the other team members perceive a particular player as a good task, motivational, social, or external leader. The demographic characteristics and two measures of the social connectedness network, namely the indegree and outdegree centrality of a player in the social connectedness network, served as predictor variables. The indegree centrality is a measure of the extent to which other team members feel connected with the particular player (termed *social connectedness from others*), whereas the outdegree centrality refers to the extent in which a particular player himself or herself feels connected to the other team members (termed *social connectedness toward others*). Because not all the predictors are networks, we could not use the social network specific QAP-regression. Instead, normal linear regressions were used, including the node-specific social network measures of degree centrality for the included networks.

Table 1 The Standardized Regression Coefficients (β) of the Regression Analyses With Players' Indegree Centrality Within Each of the Leadership Quality Networks as Dependent Variable

	Leadership Quality in General[a]	Task Leadership Quality[b]	Motivational Leadership Quality[b]	Social Leadership Quality[b]	External Leadership Quality[b]
Age	.23**	.10	.20**	.22**	.10
Leadership outside sport	.11**	.10*	.09*	.10*	.06
Years of experience	.19**	.01	–.15*	–.20**	.17*
Team tenure	–.13**	–.06	–.06–	–.03	–.12*
Captaincy[c]	.25***	.18***	.15**	.08	.23***
Playing time	.29***	.25***	.13*	.07	.18**
Team identification	.02	.07	.08	.07	.06
Social connectedness from others[d]	.34***	.48***	.61***	.68***	.29***
Social connectedness toward others[e]	–.04	–.07	–.09	–.04	–.09
R^2	.59	.60	.59	.59	.42

[a]These analyses are based on Study 1.

[b]These analyses are based on Study 2.

[c]Captaincy is a dichotomous variable indicating whether the player is a captain or not.

[d]Social connectedness from others refers to the player's indegree centrality within the social connectedness network.

[e]Social connectedness toward others refers to the player's outdegree centrality within the social connectedness network.

*$p < .05$; **$p < .01$; ***$p < .001$.

The correlations between the different predictor variables did not exceed .50, either in Study 1 or in Study 2, except for the correlation between age and years of experience ($r = .82$ in Study 1; $r = .74$ in Study 2). To exclude any possible bias due to multicollinearity, we calculated the VIF scores (i.e., variance inflation factors) for each predictor in all six regressions. All VIF scores appeared to be smaller than 3.7, which is clearly below the limit of 10 above which concern for bias is warranted (Bowerman & O'Conell, 1990; Myers, 1990). Furthermore, all tolerance scores clearly exceeded the recommended .20 threshold (Menard, 1995).

First of all, it should be noted that some beta values are negative, suggesting a negative relationship with leaders' perceived quality. However, further analyses in both studies pointed out that when entering a single predictor variable in the regression, the relationship with the perceived leadership quality in each of the roles was positive for each predictor. In other words, the negative direction of the relationship is caused by the inclusion of other predictors, known as the suppression effect (Cohen, Cohen, West, & Aiken, 2003, p. 78). Because some predictors are related with each other, the standard errors are misleadingly inflated as a result of which the positive significance of some predictors turns into nonsignificance or even into significance in the negative direction. More specifically, when years of experience was entered in the regression as only predictor, the beta values for all leadership roles were positive and significant ($p < .001$). Also for team tenure, the same procedure resulted in all positive significant beta values ($p < .05$), with only one exception: team tenure was not a significant predictor for external leadership quality. Finally, for social connectedness toward others, all beta values were positive, but significance only emerged for the perceived quality of task and social leadership ($p < .05$).

The results in Table 1 point to social connectedness from others as the most important characteristic of an athlete's social leadership quality (i.e., revealed by the highest β compared with the other attributes), thereby confirming H1a. Moreover, not only for the social leader, but also for the task, motivational, and external leader, social connectedness seems to be the key attribute determining an athlete's perceived leadership quality. In other words, the stronger teammates felt connected to a specific player, the higher they rated this player's leadership quality.

Moreover, further analyses across all the different leadership roles revealed that the superiority of social connectedness holds for all the different sports (β values ranging from .21 to .80, all ps $< .05$), for both male and female teams (β values ranging from .46 to .78, all ps $< .001$), and for teams playing at high and at low level (β values ranging from .33 to .80, all ps $< .01$). This finding thus contradicts H1: social connectedness emerged as the key attribute for all leadership roles. Only one exception emerged: connectedness from others was not seen as a significant predictor of the external leadership quality in male teams.

With respect to the other attributes, a number of substantial differences emerged between the four roles (which is in line with H1). For example, captaincy emerged as a significant predictor of athlete leadership quality in general and for task, motivational, and external leadership in particular (in line with H1b), but not for social leadership. Further analyses also revealed a number of differences as a function of sport, level, or team gender, which temper the generalizability of these findings.

Age also emerged as an important predictor: the older the players, the better they were perceived as leaders in general, and in particular with respect to the motivational and social leadership role. However, there are some other differences that should be highlighted. More specifically, age was only seen as a significant attribute of general leadership quality in soccer teams and in female teams. Similarly, with regard to motivational leadership quality, age was only a significant attribute for high-quality leaders in male teams. However, in both male and female teams, age was a significant attribute of social leadership quality.

In line with H1c, playing time was a significant attribute of the leadership quality of task and motivational leaders. For task leadership quality, playing time was the second most predictive attribute after social connectedness. Leadership experience outside the sport context was also seen as a significant predictor of the perceived leadership quality for the task, motivational, and social leader, but not for the external leader. However, this leadership experience was only a characteristic attribute of high-quality leaders in high competition level teams, not in low competition level teams.

Both team identification and social connectedness toward others (i.e., the extent to which a player feels connected with the other team members) failed to emerge as significant predictors for high-quality leaders, neither for athlete leadership quality in general, nor for leadership quality on any of the four roles. However, with respect to team identification, some sport-specific differences emerged. For example, in basketball, a player's identification with the team did emerge as a significant predictor of players' motivational ($\beta = .28$; $p < .01$) and social leadership quality ($\beta = .21$; $p < .02$). Furthermore, soccer players who identified more with the team were perceived as significantly better task leaders ($\beta = .19$; $p < .05$).

We can conclude that social connectedness from others emerged as the most important characteristic of an athlete's leadership status, regardless of the leadership role, sport, team gender, or competition level. Because both leadership and social connectedness were measured by network structures, we used specific social network measures to further investigate the link between the social connectedness network and the different leadership networks, both at the individual level (Aim 2) and at the team level (Aim 3).

Aim 2: The Leadership–Connectedness Relationship at the individual level

Which Type of Leader Relies Most on the Quality of His or Her Social Relations? To answer this question, we determined which leadership quality network explained most of the variance in the social connectedness network. Therefore, multiple QAP-regressions were conducted, in which the four different leadership quality networks functioned as predictor variables and the social connectedness network functioned as criterion variable. The highest average regression weight over all teams was found for social leadership quality (average $\beta = .34$), which is in line with H2a. In other words, players felt most strongly connected to the players whom they perceived as high-quality social leaders. Motivational leadership quality was seen as second most predictive for social connectedness in the team (average $\beta = .23$). The contributions of task and external leadership quality in explaining the variance in the social connectedness network were very small (average $\beta = .07$ and $-.01$ respectively). We can conclude that in most teams high-quality social leaders are positioned most central in the social connectedness network, followed by the motivational, task, and external leaders, which confirms H2a.

What Does It Mean—in Terms of Social Relations—To Be Perceived as a Good Leader? To address this question, we compared athletes' perceived leadership quality with particular characteristics of those athletes in the social connectedness network. More specifically, we compared the indegree centrality of an athlete in the leadership network with three specific measures in the social connectedness network: (1) athlete's indegree centrality (i.e., average extent to which other players feel connected to the athlete); (2) athlete's betweenness centrality (i.e., number of times being the link between two other players); and (3) athlete's closeness centrality (i.e., the inverse of the number of steps it takes for a player to reach all other nodes). Table 2 presents the results for the different leadership networks. The results for indegree centrality confirm our previous findings: the perceived quality of a leader is strongly related with the extent in which the other team members feel connected to that leader (i.e., indegree centrality in the social connectedness network). This finding holds for all the different leadership roles. It can be noted though that, in line with the QAP-analyses, also here the strongest relationship was found for the social and the motivational leadership network.

Albeit to a lesser extent, the results demonstrated that a player's betweenness and closeness centrality in the connectedness network were also significant predictors of his or her perceived leadership quality. Again, correlations were the highest for social and motivational leadership. In this regard, it should be noted that the correlation between indegree centrality and closeness centrality of the connectedness network was moderate to high (i.e., .67 in Study 1, and .83 in Study 2). The fact that the investigated sports teams had more direct than indirect connected ties might explain this finding (i.e., indegree centrality only relies on the direct ties, whether closeness centrality relies on both direct and indirect ties). In contrast, a node's betweenness centrality correlates only mildly with its indegree centrality in the connectedness network. This measure thus provides additional information of the attributes of high-quality leaders, which is not explained by the leader's indegree centrality. High-quality leaders thus seem to bridge the gap between other players in their team, which confirms H2b. For social leaders, this measure is most strongly related with their perceived leadership quality.

Table 2 Correlations Among the Indegree Centrality of Athletes in the Different Leadership Networks and Athletes' Indegree Centrality, Betweenness Centrality, and Closeness Centrality in the Social Connectedness Network

	Social Connectedness Network		
	Indegree centrality	Betweenness centrality	Closeness centrality
Indegree centrality of . . .			
General leadership network	.47**	.20**	.32**
Task leadership network	.66**	.18*	.54**
Motivational leadership network	.71**	.23**	.61**
Social leadership network	.73**	.30**	.66**
External leadership network	.48**	.12	.35**

*$p < .01$; **$p < .001$.

Aim 3: The Leadership–Connectedness Relationship at the Team Level

The third aim of the present article was to determine the extent in which a team's average athlete leadership quality was related with the team's social connectedness. In contrast to the previous research aims, we will now examine leadership quality and social connectedness at the team level. As outlined in the method section, two measures can be used to investigate leadership quality at the team level: network density (i.e., average leadership quality in the team) and network centralization (i.e., degree of shared leadership).

First, we calculated the density values of the different leadership quality networks, which can range between 0 and 4; a high density network has on average stronger ties (i.e., stronger leadership perceptions) than a low density network. Table 3 presents the densities of the different leadership networks with the associated standard deviations, all averaged over the analyzed teams. Second, we calculated the centralization values of the different networks, which can range between 0% (maximally shared leadership) and 100% (maximally centralized leadership). The centralization values of all 64 teams in our studies ranged between 13.18% and 62.73% (across all leadership roles), thereby revealing that sports teams are in essence characterized by shared leadership, in general, and with respect to each of the four leadership roles. The degree to which leadership was shared was very similar across the different leadership roles, with average centralizations ranging between 31.18% and 34.91%.

Aim 3 was to examine the extent to which the average quality and the sharedness of the leadership networks were linked with the team's social connectedness. Therefore, Table 3 presents the correlations between both density and centralization of the leadership networks and density of the social connectedness network. With regard to leadership density, the results revealed that the perceived quality of leadership in general was significantly related with the density of the connectedness network. With respect to the different roles, the perceived quality of task, motivational, and social leaders was significantly correlated with perceptions of social connectedness within the team. In line with H3a, the density of the social leadership quality network was most strongly correlated with the density of the social connectedness network. With regard to leadership centralization, results revealed a trend toward negative correlations with the social connectedness density. In other words, the more leadership is shared among the players, the higher the team's social connectedness, which is in line with H3b. The nonsignificance of these correlations might be attributed to the limited number of teams and the small variance in centralization scores.

It should be highlighted that shared leadership is not always effective: if all players perceive all their teammates as very poor leaders, we obtain a centralization score of 0% (maximally shared leadership), but a density score of 0 (no leadership quality in the team). A measure of *effective* shared leadership is thus characterized by low centralization scores but high density scores (D'Innocenzo et al., 2014; Mayo et al., 2003). To compare teams across both dimensions, we conducted a mean-split procedure for both centralization and density. The densities of the social connectedness networks for each of the combinations are displayed in Table 4. For each of the leadership roles, the highest social connectedness was found in teams characterized by a high leadership density. The differences between high/low leadership centralization are negligible. In this regard, it should be highlighted that all teams were characterized by shared leadership, so that the difference between high and low centralization teams were fairly small. Given the fact that the total number of teams was limited (i.e., 25 teams in Study 1 and 21 teams in Study 2), the analyses at the team level should be considered as exploratory.

Table 3 Means (*SD*) of the Density and Centralization of the Different Leadership Networks, as Well as Their Correlations With the Density of the Social Connectedness Network

			Correlation Between Social Connectedness Density and . . .	
Leadership Quality Networks	*Density M (SD)*	*Centralization M (SD)*	Leadership density	Leadership centralization
1. General leadership[a]	1.92 (.22)	34.56 (8.58)	.57**	–.16
2. Task leadership[b]	2.18 (.24)	34.72 (8.35)	.60**	–.41
3. Motivational leadership[b]	2.34 (.28)	32.39 (8.90)	.48*	–.31
4. Social leadership[b]	2.43 (.22)	31.18 (6.94)	.61**	–.12
5. External leadership[b]	1.80 (.53)	34.91 (13.09)	.39	–.02

[a]These analyses are based on Study 1.

[b]These analyses are based on Study 2.

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 4 Density Values of the Social Connectedness Network Across Different Levels of Density and Centralization of the Leadership Networks

	Leadership Networks Characterized by . . .			
Density of the Social Connectedness Network	Low density / Low centralization	Low density / High centralization	High density / Low centralization	High density / High centralization
General leadership[a]	2.40	2.57	2.78	2.74
Task leadership[b]	2.62	2.66	2.94	2.71
Motivational leadership[b]	2.66	2.63	2.82	2.91
Social leadership[b]	2.71	2.61	2.82	2.82
External leadership[b]	2.62	2.66	2.80	2.81

[a]These analyses are based on Study 1.

[b]These analyses are based on Study 2.

Discussion

It has been acknowledged that leadership effectiveness is determined in large part by group members' perceptions of the leader (Haslam, Reicher, & Platow, 2011). Nevertheless, there is only scarce research on leadership as a team-level construct in a sport setting. To our knowledge, the current study is the first in a sport setting that uses SNA to obtain more insight in the attributes of high-quality athlete leadership, both at the individual and at the team level.

Aim 1: Attributes of High-Quality Athlete Leaders

First, we identified the most important attributes of an athlete's leadership quality as perceived by the other team members. We distinguished between four different leadership roles that a player can occupy (i.e., task, motivational, social, and external leader). The results revealed that the degree to which athletes felt connected with their leader was most strongly related to athletes' perceptions of that leader's quality. This finding holds both for leadership quality in general and for the leadership quality on each of the four specific leadership roles. These results challenge the widespread belief that the leadership quality of an athlete is not related with his or her popularity within the team (Holmes et al., 2010). However, they do corroborate earlier social network research in organizational settings, revealing that good social relations between group leaders and both peers and followers lead to more secure favorable leadership perceptions (Mehra et al., 2006). In addition, the results align with previous sport research, demonstrating that teammates' perceptions of connectedness are characteristic for athlete leaders (Moran & Weiss, 2006; Price & Weiss, 2011; Tropp & Landers, 1979). Furthermore, it should be noted that the most predictive characteristic for a leader's perceived quality was not the degree to which the leader felt connected with the other team members, but instead, the degree to which the others felt connected to the leader. As a consequence, the study findings support the idea that followers hold the key to effective leadership (Haslam et al., 2011).

Although we hypothesized that different leader attributes would be predictive in determining the leadership quality in the four different leadership roles (H1), the study findings revealed that social connectedness is the key to effective leadership for every leadership role. It should be noted though that only a limited selection of attributes was assessed. Therefore, it is plausible that important role-specific characteristics were not included in our questionnaire.

Moreover, with regard to other attributes that were measured, differences between the four leadership roles did emerge, which does align with H1. For example, being a captain was perceived as an important predictor for the perceived quality of task, motivational, and external leaders (in line with H1b), but not for the perceived quality of social leaders. This finding adds to the literature that the formal recognition of being a team captain is more strongly linked with athletes' perceived leadership quality than characteristics such as age, years of experience, and team tenure. Furthermore, in line with H1c, playing time was demonstrated to be an important attribute for the leadership quality of task, motivational, and external leaders, but not for social leaders, thereby confirming previous findings (Rees & Segal, 1984). Finally, age was seen as an important characteristic for high-quality motivational and social leaders, thereby confirming previous research that social leaders were mostly seniors, whereas task leaders were spread among juniors and seniors (Rees & Segal, 1984). Age, as an indicator of accumulated relevant life experiences, can facilitate abilities such as solving interpersonal conflicts or steering someone's on-field emotions in the right direction (Grossmann et al., 2010; Staudinger & Baltes, 1996). Older players may have acquired more control over their own emotions, which could make it easier to focus on others' emotions and on the interpersonal relations within the team.

Aim 2: The Leadership–Connectedness Relationship at the Individual Level

Because social connectedness emerged as the key indicator of leadership quality, we used specific social network measures to provide more insight in the relationship between leadership quality and social connectedness. QAP-regressions thereby confirmed H2a by revealing that social leaders rely more on the quality of their social relation with teammates, than motivational, task, or external leaders. To be perceived as a good leader, it seems important that other players feel closely connected to that leader, but also that the leader bridges the gap between other teammates. Imagine a team in which player A feels connected to the social leader, but not to player B. If the social leader feels connected to player B, this gap bridging provides the social leader with power to solve interpersonal conflicts. This finding holds for leadership in general, and for task, motivational, and social leadership in particular, thereby confirming H2b. Furthermore, these results align with previous organizational research indicating that betweenness centrality can be considered as a measure of control and influence (e.g., Moolenaar, Daly, & Sleegers, 2010; Mullen, Johnson, & Salas, 1991).

Aim 3: The Leadership–Connectedness Relationship at the Team Level

The study findings suggest that social connectedness is not only an attribute of the perceived leadership quality at the individual level, but also a team-level attribute for teams with high-quality athlete leadership. In line with our expectations (H3a), the average social leadership quality in the team was the most predictive variable for high levels of social connectedness within the team. These findings are in line with previous studies that have demonstrated the positive impact of leaders on the team's cohesion, both of coaches (De Backer et al., 2011) and of athlete leaders (Callow, Smith, Hardy, Arthur, & Hardy, 2009; Crozier et al., 2013; Vincer & Loughead, 2010).

It is noteworthy that, when looking back at the individual level of analysis and more specifically to the QAP regressions, no significant relationship emerged between a player's perceptions of task leadership quality and his or her perceptions of connectedness. Although feeling closely connected with the motivational and social leader was positively related to the perceptions of these leaders' quality, these social connectedness perceptions did not matter when rating a player's task leadership quality.

At the team level by contrast, the team's task leadership quality was strongly related with the team's connectedness. In other words, higher task leadership qualities in the team go hand in hand with higher social connectedness among the members. A possible explanation is that higher task leadership qualities within the team foster a task-oriented climate and higher levels of collective efficacy (Fransen, Coffee, et al., 2014; Fransen, Haslam, et al., 2015). In this regard, the observed findings correspond to previous studies demonstrating the beneficial nature of a task-involving motivational team climate and collective efficacy for the formation and development of not only task cohesion, but also of social cohesion (Boyd, Kim, Ensari, & Yin, 2014; Eys et al., 2013; Heuze, Raimbault, & Fontayne, 2006). Although social connectedness might not impact perceptions of task leadership quality at the individual level, having high-quality task leaders in the team is important for having a strongly connected team. As Boyd et al. (2014, p. 120) noted, "collective effort to improve group performance where each player fulfills a distinctive role on the team, may serve to break down social barriers subsequently generating player interdependence and team camaraderie on and perhaps off the field."

Finally, we also assessed the leadership centralization of all teams (i.e., the degree to which leadership is shared among team members). The low centralizations indicate that sports teams are characterized by shared athlete leadership: not only *between* the different leadership roles, but also *within* the different leadership roles. Furthermore, the results revealed a trend toward a negative correlation between leadership centralization and social connectedness density, thereby confirming H3b. In other words, the more leadership is shared among team members, the stronger the team's social connectedness. These results align with previous organizational research showing that there is more social integration in teams where leadership is shared between the members (Pearce et al., 2004). However, when looking at the interplay between density and centralization, the current study suggests that leadership density is more decisive for the team's social connectedness than leadership centralization. The small variance in leadership centralization across the different teams might explain this finding.

Strengths, Limitations, and Further Research Avenues

A major strength of this study is the relatively large number of participating teams. Previous studies using SNA in a sports setting tested one to three sports teams (Bourbousson et al., 2015; Cotta et al., 2013; Kyoung-Jin & Yilmaz, 2010; Lusher et al., 2013; Lusher et al., 2010; Passos et al., 2011; Warner et al., 2012). By conducting two studies, which together encompassed the data of 46 teams, containing 575 players in total, the present article by far exceeds the sample size of the previous network studies, which enhances the reliability and generalizability of our findings. Nevertheless, it should be noted that caution is warranted when interpreting the results at the team level of analysis, given the limited number of teams (respectively $N = 25$ in Study 1 and $N = 21$ in Study 2).

A second strength is that to allow for the comparison between gender, competition levels, and sports, the current study opted for a stratified sampling technique, which resulted in a variety of male and female participating athletes, playing at low and high competition levels in

four different sports. Previous researchers have suggested that it is important to examine issues such as gender and playing level when studying leadership in sport (Price & Weiss, 2011). Nevertheless, most studies on athlete leadership have only examined either male or female teams at a specific competition level, limiting comparisons on these aspects. The only exception with respect to team gender is the study by Moran and Weiss (2006), in which both male and female players were examined. These authors identified gender differences in that the perceptions of athlete leader's quality, as rated by teammates, included both psychological and social qualities (e.g., friendship quality) for males, whereas for females, perceptions of athlete leadership quality were only related to higher sport competence. The current article suggested a high degree of equivalence between male and female players, between high and low competition level, and between the different sports. For instance, within all these groups, the perceptions of social connectedness emerged as key attribute for high-quality leadership. In contrast, significant differences between these groups emerged, for instance with regard to the other leader attributes that were tested. Future research should take into account that findings on athlete leadership cannot automatically be generalized, regardless of team gender, competition level, or sport.

In addressing the limitations of the present research, several opportunities for future research emerge. First, in terms of the study design, we explored only for a limited selection of attributes whether they were characteristic for high-quality athlete leaders and for teams having high athlete leadership quality. In doing so, we demonstrated that the social network approach constitutes a novel and pioneering tool to study leadership attributes in sports settings. Future research could use this network approach to examine a wider variety of leadership attributes, thereby perhaps identifying other characteristic attributes of high-quality athlete leadership.

Second, although the findings of the current study highlight the link between athlete leadership quality and social connectedness, the cross-sectional nature of the study does not allow determining the direction of this relationship. It could be that the more players feel connected to their leader, the better they rate his or her leadership qualities. However, it could also be that the more players perceive their leader as a good leader, the more they feel connected to him or her. It seems likely that the relationship between connectedness and perceived leadership quality is reciprocal (i.e., both constructs influencing each other). Therefore, future research should try to determine the relative strength of this bidirectional association by using experimental designs.

Such experimental designs could also provide more insight in the effectiveness of shared leadership, compared with vertical leadership (i.e., a single leader). In the present research, all teams were characterized by shared leadership, as a result of which no proper comparison was possible. Future research could experimentally manipulate the degree of shared leadership in sports teams and investigate the effects on social connectedness and on other team outcomes.

Another fruitful line for further research concerns the advancement of an effective athlete leadership development program. The present study demonstrated the importance of high-quality athlete leadership for social connectedness. In addition, previous research emphasized several other positive outcomes of high-quality athlete leaders, such as team resilience, team cohesion, athletes' satisfaction, team confidence, team identification, and team performance (Fransen, Coffee, et al., 2014; Fransen, Haslam, et al., 2015; Fransen et al., 2012; Morgan et al., 2013, 2015; Price & Weiss, 2011; Vincer & Loughead, 2010). Therefore, future research should further clarify the processes through which effective leadership skills can be developed. In doing so, the effectiveness of leadership development programs should be evaluated within different sports and at different levels.

Theoretical and Practical Implications

One important research challenge for social psychologists, following from previous research (e.g., Haslam et al., 2011; Thomas, Martin, & Riggio, 2013), was to demonstrate that the group processes associated with leadership have more explanatory power than the more leader-centric approaches to leadership. We have demonstrated that SNA constitutes a novel and potentially valuable tool for obtaining a deeper insight in athlete leadership within teams, thereby taking into account the surrounding team context. By including a team-level perspective on athlete leadership, we counterbalanced the leader-centered approach that has dominated athlete leadership research so far. In fact, the degree to which others felt connected to the leader (i.e., a typical team-level construct) appeared to be more decisive for a leader's perceived leadership quality on each of the leadership roles than typical leader-centered attributes (e.g., age, years of experience, sport competence).

In addition, the findings of the current study involve practical implications that could be considered by coaches, sport psychologists, and other sport professionals. First of all, SNA can be applied to identify the leadership structures in a sports team. Identifying the key leaders in the team for each of the four leadership roles is a first step in a leadership development program. The findings of the current study can then be used to develop a specific program for each of the leaders to obtain role-specific high-quality athlete leadership. Moreover, the technique of SNA can also be used to map the social connectedness relations within a team. The visualization of such a network might offer additional insights to the coach by revealing potential cliques within the team. A coach with knowledge of the key relational structures within the team can more effectively lead the team to success, and SNA provides a promising avenue to reach this aim.

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